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REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDING JUNE 30, 1899.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1899.

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REPORT
OF
THE SURGEON-GENERAL.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., October 12, 1899.

SIR: I have the honor to submit a report of my administration of the duties of this office during the past fiscal year.

FINANCIAL STATEMENT, 1899.

Medical and hospital department, 1899.

Appropriated by act approved—		
March 15, 1898	$115,000.00	
January 5, 1899	2,300,000.00	
March 3, 1899	350,000.00	
		$2,765,000.00
Refunded during the year		108.72
Total to be accounted for		2,765,108.72
Disbursed during the year:		
Expenses of medical supply depots	268.66	
Medical supplies	1,047,065.11	
Medical attendance and medicines	40,186.24	
Medical expenses of recruiting	11,165.06	
Medical expenses of muster out	3,316.40	
Pay of nurses	102,221.87	
Pay of other employees	64,357.64	
Washing at hospitals	35,306.36	
Exchange on funds in foreign possessions	576.91	
Miscellaneous expenses	571.71	
Unclassified[1]	11,685.39	
		1,316,721.35
Balances on hand June 30, 1899:		
In United States Treasury	1,391,287.83	
In hands of disbursing officers—		
New York	24,680.12	
San Francisco	15,058.32	
Havana, Cuba	162.45	
Santiago, Cuba	3,071.39	
Puerto Principe, Cuba	130.71	
San Juan, P. R	1,499.02	
Honolulu, H. I	1,990.26	
Manilla, P. I.	7,232.95	
Hospital ship *Missouri*	1,256.58	
Hospital ship *Terry*	2,017.74	
		[2] 1,448,387.37
Total accounted for		2,765,108.72

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[1] Being the amount disbursed by the chief surgeon at Manila, P. I., in June, 1899, for which itemized accounts have not yet reached this office.

[2] It is estimated that about $500,000 of this will revert to the Treasury.

Medical and hospital department, 1898.

Balance on hand July 1, 1898, act of March 2, 1897		$10,836.34
Refunded during the year		384.15
Total to be accounted for		11,220.49
Disbursed during the year:		
Medical supplies	$10,563.75	
Medical attendance and medicines	215.70	
Medical expenses of recruiting	1.20	
Washing at hospitals	30.56	
Miscellaneous	43.10	10,854.31
Balances on hand June 30, 1899:		
In United States Treasury	346.43	
In hands of disbursing officer at New York	19.75	366.18
Total accounted for		11,220.49

Medical and hospital department, 1897.

Balance on hand July 1, 1898, act of March 6, 1896	$29,487.22
Transferred to surplus fund	29,487.22

Medical and hospital department, January 1, 1899.

Balance on hand July 1, 1898, acts of May 4, 1898, and June 8, 1898		$42,956.00
Appropriated by act approved July 7, 1898		504,000.00
		546,956.00
Refunded during the year		407.19
Total to be accounted for		547,363.19
Disbursed during the year:		
Expenses of medical supply depots	95.79	
Medical supplies	458,280.96	
Medical attendance and medicines	8,461.19	
Medical expenses of recruiting	22,747.75	
Pay of nurses	28,614.50	
Pay of other employees	17,721.34	
Washing at hospitals	6,517.00	
Miscellaneous expenses	6.00	542,444.53
Balances on hand June 30, 1899:		
In United States Treasury (net)	[1] 1,377.55	
In hands of disbursing officer, Philippine Islands	3,541.11	4,918.66
Total accounted for		547,363.19

Appropriation for national defense, act of March 9, 1898.

Allotment by the President, April 16, 1898:		$35.61
Balance on hand July 1, 1898	$30.10	
Disbursed during the year	5.51	
Balance on hand June 30, 1899		35.61

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[1] Actual balance, as shown by the books of this office, $9,174.16, of which $7,796.61 was pledged to honor drafts made by the disbursing officer of the medical department in the Philippine Islands on the Hongkong and Shanghai Banking Corporation, under a letter of credit issued in his favor. These drafts were paid by the bank and the proceeds thereof are accounted for by the disbursing officer, and in this statement, as disbursed by him during the year or in his possession June 30, 1899. The bank was reimbursed by the Treasury Department in August, 1899.

Reallotment by the President, September 8, 1898:		
Reallotment, September 8, 1898		$500,000.00
Refunded during the year		115.50
Total to be accounted for		500,115.50
Disbursed during the year:		
Expenses of medical supply depots	99.60	
Medical supplies	382,815.94	
Medical attendance and medicines	8,007.79	
Medical expenses of recruiting	9,440.87	
Pay of nurses	68,702.12	
Pay of other employees	12,680.94	
Washing at hospitals	16,481.46	
Exchange on funds in foreign possessions	100.00	
Miscellaneous expenses	107.00	
		498,435.72
Balances on hand June 30, 1899:		
In United States Treasury	1,679.66	
In hands of disbursing officer at San Juan, P. R	.12	
		1,679.78
Total accounted for		500,115.50

Allotment by the President October 6, 1898:		
Allotment October 6, 1898		500,000.00
Refunded during the year		141.00
Total to be accounted for		500,141.00
Disbursed during the year—		
Expenses of medical supply depots	7.40	
Medical supplies	326,313.98	
Medical attendance and medicines	31,296.10	
Medical expenses of recruiting	4,796.15	
Medical expenses of muster out	2,555.60	
Pay of nurses	54,909.20	
Pay of other employees	17,633.42	
Washing at hospitals	17,998.69	
Exchange on funds in foreign possessions	93.57	
Miscellaneous expenses	15.00	
		455,619.11
Balances on hand June 30, 1899—		
In United States Treasury	38,508.20	
In hands of disbursing officers—		
Atlanta, Ga	4,877.27	
Havana, Cuba	1,136.35	
San Juan, P. R	.07	
		44,521.89
Total accounted for		500,141.00

Allotment by the President November 22, 1898:		
Allotment November 22, 1898		500,000.00
Refunded during the year		32.00
Total to be accounted for		500,032.00
Disbursed during the year—		
Medical supplies	371,698.78	
Medical attendance and medicines	36,398.81	
Medical expenses of recruiting	15,835.66	
Medical expenses of muster out	4,262.42	
Pay of nurses	29,710.07	
Pay of other employees	8,309.54	
Washing at hospitals	7,580.42	
		473,795.70

Allotment by the President November 22, 1898—Continued.

Balances on hand June 30, 1899—		
In United States Treasury	$22,022.77	
In hands of disbursing officer, hospital ship *Relief*	4,213.53	
		$26,236.30
Total accounted for		500,032.00

Artificial limbs, 1899.

Appropriated by act approved July 1, 1898	$125,575.00
Disbursed during the year	122,953.91
Balance on hand June 30, 1899	2,621.09

Artificial limbs, 1898 (act approved June 4, 1897).

Balance July 1, 1898	$23,224.73
Disbursed during the year	6,708.52
Balance on hand June 30, 1899	16,516.21

Artificial limbs, 1897 (act approved June 11, 1896).

Balance July 1, 1898		$10,089.44
Disbursed during the year	$421.38	
Transferred to surplus fund	9,127.90	
		9,549.28
Balance on hand June 30, 1899		540.16

Artificial limbs, certified claims, 1896 and prior years.

Appropriated by act approved July 7, 1898 1	$100.00
Disbursed during the year	100.00

Appliances for disabled soldiers, 1899.

Appropriated by act approved July 1, 1898	$2,000.00
Disbursed during the year	1,277.89
Balance on hand June 30, 1899	722.11

Appliances for disabled soldiers, 1898 (act approved June 4, 1897).

Balance July 1, 1898	$717.79
Disbursed during the year	127.25
Balance on hand June 30, 1899	590.54

Appliances for disabled soldiers, 1897 (act approved June 11, 1896).

Balance July 1, 1898	$785.02
Transferred to surplus fund	500.00
Balance on hand June 30, 1899	285.02

Army Medical Museum, 1899.

Appropriated by act approved March 15, 1898	$5,000.00
Disbursed during the year	3,363.69
Balance on hand June 30, 1899	1,636.31

Army Medical Museum, 1898 (act approved March 2, 1897).

Balance July 1, 1898	$69.28
Disbursed during the year	69.28

Library, Surgeon-General's Office, 1899.

Appropriated by act approved March 15, 1898	$10,000.00
Disbursed during the year	9,726.64
Balance on hand June 30, 1899	273.36

Library, Surgeon-General's Office, 1898 (act approved March 2, 1897).

Balance July 1, 1898	$253.21
Disbursed during the year	253.21

Furnishing and fitting trusses for disabled soldiers (secs. 1176, 1178, R. S., act March 3, 1879).

Expended during the year	$5,003.00

Providence Hospital.

Appropriated by act approved July 1, 1898	$19,000.00
Expended during the year	19,000.00

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the provisions of law relating to artificial limbs there were furnished during the year ended June 30, 1899, 27 artificial legs, 4 arms, 1 foot, and 1 apparatus for exsection. Commutation certificates were issued for 105 cases of amputated leg, 70 of amputated arm, 12 of amputated foot, and for 1,934 cases of loss of the use of a limb. These cases involved an expenditure of $125,038.91 from the appropriations available.

These benefits to disabled soldiers recur under existing laws every three years, so that the cases which matured and were paid during the year ended June 30, 1898, will again come up for payment if the beneficiaries are alive during the year ending June 30, 1901. There were in the files of the office 3,580 cases which matured during the fiscal year 1898. The commutation value of these cases was $182,755. Allowing for deaths during the past three years, I estimate that there will be 3,400 claims presented during the year ending June 30, 1901, and that the sum of $173,000 will be required to settle them. Estimates have already been submitted for this sum.

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,309.89 was expended for 149 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 1,088.

PROVIDENCE HOSPITAL.

The act of Congress approved July 1, 1898, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with this hospital by the Surgeon-General of the Army. The relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1898	118
Admitted during the year	1,238
Total number treated	1,356

Average number admitted per month	113
Number remaining in hospital, June 30, 1899	112
Total number of days' treatment afforded	38,758
Average number of days' treatment per patient	30
Average number of patients treated per day	106
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	21

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

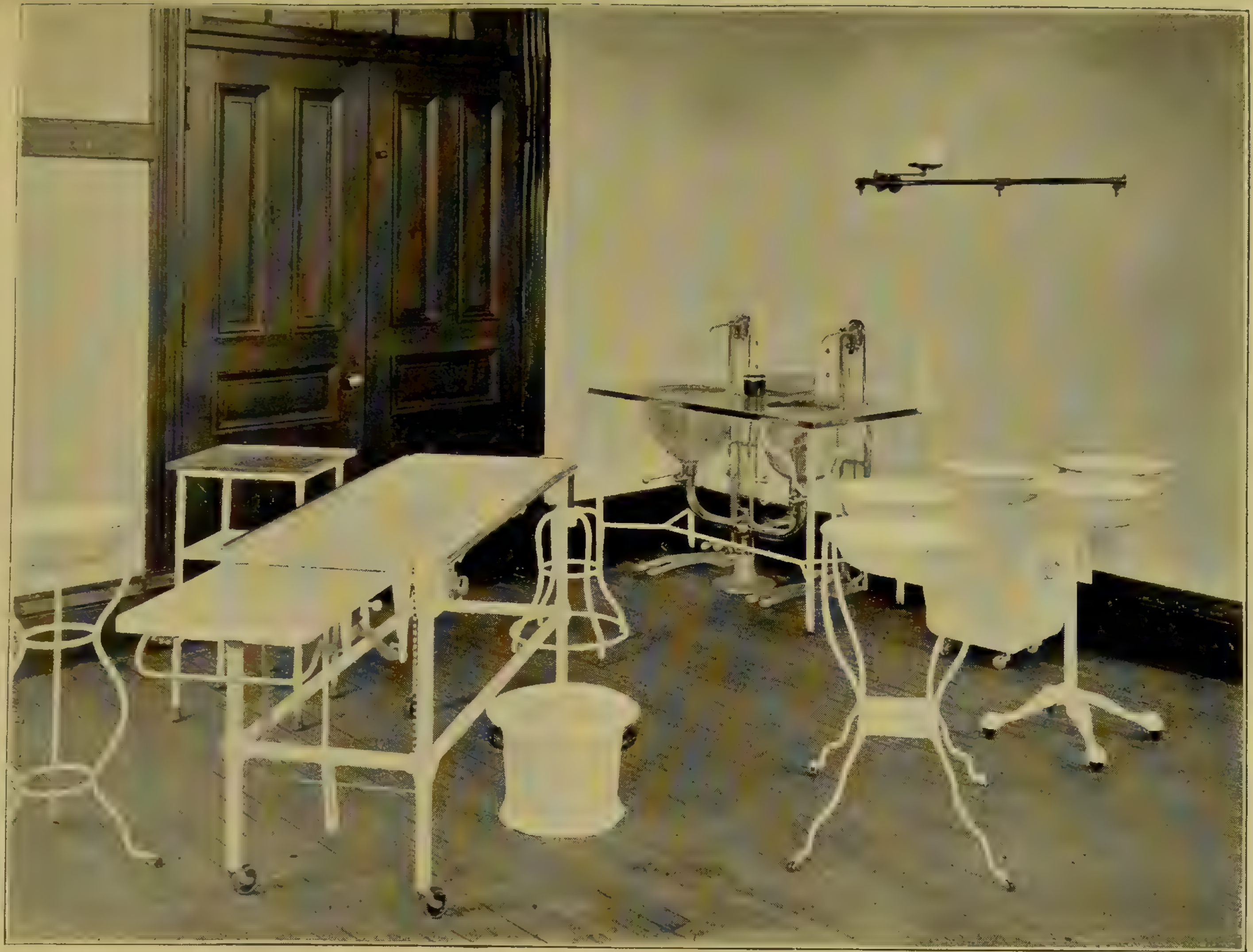
In the officers' division of this hospital 6 cases remained under treatment December 31, 1897, and 29 were admitted during the calendar year 1898, a total of 35. Two of these died, 6 remained under treatment December 31, 1898, and 27 were returned to duty or to their residences, if retired, after an average of thirty-seven days of treatment. The maximum treated at one time was 10. No officer was under treatment during July, 1898.

In the men's division there remained December 31, 1897, 22 cases, while during the year 1898 119 were admitted, a total of 141. Of these cases 106 were completed during the year—84 by return to duty, 20 by discharge as unfit for further military service, 1 by discharge by order of the Adjutant-General's Office, and 1 by expiration of service. Sixty-three of these completed cases were rheumatic, and of these 52 were returned to duty.

Under the conditions and regulations prescribed by me and approved by the Secretary of War (circular Surgeon-General's Office, May 8, 1897), ex-volunteers of the civil war were admitted to this hospital. On November 9, 1898, the benefits of the hospital were extended to ex-volunteers of the Spanish-American war. To December 31, 1898, 176 permits of admission were issued. Of these, 116 were granted during the year 1898. Ninety-six availed themselves of this permission and reported for treatment. The remaining 18 permits were either canceled by me, or the beneficiaries declined, for various reasons, to utilize them. The greater part of these 96 cases returned to their homes much benefited by the baths. Some of them on admission were recognized as beyond all help. They ranged in age from 55 to 80 years, and their complaints were all of a chronic character. Nevertheless, their sufferings were relieved and their remaining years made comfortable.

HOSPITALS, POST AND GENERAL.

New post hospitals were completed during the year at Fort Hancock, N. J.; Fort Snelling, Minn.; Fort Point, Tex.; Fort Morgan, Ala., and Tybee Island, Ga., and temporary hospitals at Fort Williams, Me.; Fort Greble, R. I.; Fort Mott, N. J.; Marrowstone Point and Battery Point, Del.; Fort Caswell, N. C., and Egmont Key, Fla. Additional wards were provided for the hospitals at Fort Thomas, Ky., and Fort Wayne, Mich., and new hospitals were authorized for Fort Slocum, N. Y.; Plum Island, N. Y., and the new post near Seattle, Wash. General hospitals, each with a capacity of 1,000 beds, were completed at Fort Monroe, Va., and Savannah, Ga., and pavilion wards were erected in connection with the post hospitals at Washington Barracks, D. C.; Jefferson Barracks, Mo.; Fort Columbus, Fort Hamilton, and



OPERATING ROOM, HOSPITAL. WASHINGTON BARRACKS, D. C.

Fort Wadsworth, N. Y. Various repairs and improvements were made to the hospitals at a number of posts.

In addition to those mentioned, general hospitals have been organized at San Juan, Porto Rico, and at Havana, Pinar del Rio, Matanzas, and Santiago, Cuba, while in both islands hospitals have been constructed or improved at the many military posts that have been established. In Manila four hospitals have been outfitted (see page 100); in San Francisco, Cal., provision has been made for the care of the sick of commands going to or returning from the Philippines (see page 115), and in Honolulu, H. I., a hospital has been established for the care of serious cases taken from transports en route across the Pacific (see page 138).

The following report shows the conditions of the general hospitals, as communicated to this office September 23, 1899:

	Remaining from last week.	Admissions.			Total to be accounted for.	Returned to duty.	Died.	Discharged from service.	Furloughed.	Transferred to other hospitals.	Otherwise disposed of.	Remaining at end of week.	Number of vacant beds on last day of week.
		From command.	By transfer.	From other sources.									
Washington Barracks, D. C., general hospital	39	14	----	----	53	14	----	----	----	----	----	39	86
Josiah Simpson general hospital, Va	------	------	----	----	------	------	----	----	----	----	----	------	1,020
Camp Meade, Pa., general hospital	52	------	24	----	76	22	----	1	1	----	----	52	48
Presidio, San Francisco, Cal., general hospital	574	114	----	----	688	108	1	24	4	3	1	547	177
Military hospital, No. 1, Havana, Cuba	91	5	3	----	99	24	----	----	----	----	----	75	50
Provinces of Havana and Pinar del Rio, Cuba	361	272	----	2	635	313	----	----	----	----	----	332	94
Matanzas military hospital, Cuba	42	29	----	----	71	30	1	----	----	----	----	40	80
Santiago, Cuba, general hospital	29	------	7	3	39	8	----	----	----	19	----	12	63
San Juan, Porto Rico, general hospital	77	2	23	4	106	31	----	1	----	----	----	71	129
Manila (by cable)	------	------	----	----	------	------	----	----	----	----	----	1,655	83

MEDICAL AND HOSPITAL SUPPLIES.

The annual report of the Surgeon-General for the fiscal year ended June 30, 1898, rendered November 10, 1898, took up at considerable length the operations of the medical department in regard to furnishing medical and surgical supplies during the Spanish war, and it is deemed unnecessary to repeat what is therein stated.

The operations of the supply department, which were necessarily conducted under the pressure of the emergencies of war were gradually brought into more regular and methodical action.

No appliance or apparatus of moment has been devised or put into use since the publication of the last report, the energies of the office being devoted to obtaining medical supplies in sufficient quantity and to effecting their prompt distribution to the points at which they were needed.

The regular medical supply depots at New York, St. Louis, and San Francisco have been kept up. That at New York has supplied the troops in the northern and eastern portions of the United States and also Cuba and Porto Rico. Increased facilities were required to properly conduct the business of this depot and a special building was hired for the purpose to the great advantage of the Government. The depot in St. Louis has supplied the troops and garrisons in camps in the Mississippi Valley and portions of the country most convenient to it.

Medical supplies for the Philippine Islands, with the exception of the large amount that was sent on the hospital ship *Relief*, which left New York March 2, 1899, have been furnished from the San Francisco depot. Medicines and most of these supplies were purchased on the Pacific coast, only articles of exclusively eastern manufacture being sent from New York and St. Louis. The uniform report from the Philippine Islands has been that medical supplies have been ample.

After the breaking up of Camp Thomas at Chickamauga and the establishment of camps in the Southern States, the supply depot at Camp Thomas was removed to Atlanta, Ga., and the troops and camps in the southern section of the United States were supplied from it. This depot has since been discontinued.

With the departure of the Second Corps from the United States to Cuba in December, 1898, the supply depot attached to that corps was retained at Savannah as a convenient place for shipping supplies and furnishing troops en route.

In addition to the depots already referred to, there is an important one in Manila for the immediate supply of troops in the Philippine Islands; one in Havana, Cuba, and one at San Juan, Porto Rico.

The depot for the preparation and refitting of medical and surgical chests has been maintained at the Army Medical Museum at Washington and has proved of great advantage.

In November, 1898, an outfit allowance for regimental hospitals was approved, the object being to provide for the treatment of emergency cases and of those requiring only slight treatment, without impairing the mobility of the regiment.

Three ice machines have been furnished for the use of the hospitals in the Philippine Islands; another is in process of erection at San Juan, Porto Rico. The machines that were presented to the Government at Ponce and Santiago have been kept in repair.

X-ray machines for the better diagnosis and treatment of wounds and injuries have been placed at all important posts and hospitals and on the hospital ships. Four have been sent to the Philippine Islands for use in the hospitals there.

Microscopes, to assist in the prompt recognition of disease, have been issued to hospitals, general and field, and also for the use of regimental surgeons.

It has been my endeavor that the sick and wounded of our Army should be supplied with every comfort and restorative and the surgeons with every appliance that modern science would suggest in the treatment of disease and injury.

Not only have supplies of all kinds allowed by the standard supply table been freely issued, but the individual preferences of surgeons have been indulged where there was reason to believe that benefit would arise from so doing.

As an indication of the extent of the operations of the supply department, I give below the quantities issued during the fiscal year ending June 30, 1899, of a few of the more important articles:

Æther, in 4-ounce tins	tins	21,000
Antipyrinum, in 4-ounce bottles	bottles	5,234
Bismuthi subgallas, in half-pound bottles	do	5,500

Bismuthi subnitras, in 1-pound bottles	bottles	7,753
Chloroformum, in 4-ounce bottles	do	25,354
Magnesii sulphas	pounds	53,160
Morphinæ sulphas, in one-eighth ounce bottles	bottles	3,804
Morphinæ sulphas, tablets	number	686,000
Opii tinctura, in 1-pound bottles	bottles	4,702
Opii, tinctura camphorata, in 1-pound bottles	do	9,705
Phenacetinum, in 4-ounce bottles	do	6,600
Pilulæ camphoræ et opii	number	2,893,200
Pilulæ catharticæ compositæ	do	2,729,800
Quininæ sulphas, in 1-ounce bottles	bottles	44,156
Quininæ sulphas, pills	number	32,741,500
Salol, tablets	do	4,820,375
Strychninæ sulphas, tablets	do	4,584,000
Lime chloride	pounds	104,541
Beef extract, in 4-ounce tins	tins	62,429
Brandy, in 1-quart bottles	bottles	28,919
Milk, condensed, in 1-pound tins	tins	34,799
Malted milk, in 4-pound bottles	pounds	32,756
Whisky, in 1-quart bottles	bottles	40,747
Bandages	dozen	79,400
Cotton, absorbent, in 1-ounce packages	ounces	381,088
First-aid packets	number	359,241
Gauze, plain	yards	195,815
Syringes, hypodermic	number	1,772
Thermometers, clinical	do	14,321
Bedsteads and cots	do	32,380
Blankets	do	69,176
Mattresses	do	27,622
Mosquito bars	do	26,072
Pillows	do	45,994
Pillow cases	do	97,879
Sheets	do	138,016
Towels	dozen	18,145
Field operating cases	number	287
Mess chests	do	556
Pocket cases	do	1,114
Field desks	do	666
Litters	do	3,516
Litter-slings	do	6,233
Hospital corps pouches	do	5,216
Orderly pouches	do	829
Medical, surgical, and sterilizer chests	do	814
Vaccine virus, points, and tubes	do	170,000
Chairs, arm, folding	do	1,986
Chairs, small, folding	do	12,734
Tables, mess, folding	do	1,032
Tables, bedside, folding	do	11,940

THE ARMY MEDICAL MUSEUM.

The question of space for the better accommodation of the present holding of the museum and for the additions which experience shows are to be expected is already obtruding itself. Some special and valuable exhibits, such as surgical instruments, medical medals, photographs, and specimens of medical field equipments of our own and foreign military services, already suffer from insufficient or unsuitable presentation. The last is particularly worthy of completion and satisfactory display, but this cannot be effected while the rooms in the building are used for other purposes than those of the library and museum.

The immediate needs of the library will be met by the addition of six new stacks, for which estimates have been submitted for several years past. Were these stacks erected, the whole containing capacity of the library hall would be utilized, for the space that would remain is necessary for the convenience of those who make use of the volumes. For the future extension of the library no space at present within my jurisdiction is available, although the large room immediately below the library hall, and of the same floor area, is exactly suitable for this purpose. This commodious room is now utilized as a record room for the Record and Pension Division of the War Department; but there is no doubt in my mind that it must sooner or later be assigned for library purposes if this subject is wisely considered. In fact, there is no avoiding the conclusion that the whole of the office rooms on the first floor of the building now occupied by the Record and Pension Division should pass into my control for the use of the growing library and museum, for which the whole building was originally constructed. No one who is well informed as to the needs of the library and museum, their value to the medical profession and to the public, and the means by which this value may be increased, will hesitate to state that the control of the whole building for the use of the library and museum is abundantly justified. I therefore earnestly recommend that provision be made elsewhere for the work of the Record and Pension Division of the War Department, and that justice may be done to the intent for which this building was constructed.

As the facilities afforded by the museum are frequently sought by investigators in particular lines of research, the preparation of a catalogue seems desirable, none having been printed since 1866, when the number of specimens was comparatively few and a different classification was followed. Such a catalogue would involve much labor, but if in existence and properly distributed would make the extensive collection of the museum widely known and correspondingly available for students.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1899, was 35,039. The following statement shows in detail the additions and changes in the different sections:

Pathological section:		
In museum June 30, 1898		11,446
Returned to the contributor		1
		11,445
Received during the year		186
In museum June 30, 1899		11,631
Anatomical section:		
In museum June 30, 1898		1,518
Received during the year		11
In museum June 30, 1899		1,529
Section of comparative anatomy:		
In museum June 30, 1898		1,606
Discarded	32	
Transferred to other institutions	142	
		174
In museum June 30, 1899		1,432
Microscopical section:		
In museum June 30, 1898		12,750
In museum June 30, 1899		12,750

Miscellaneous section:	
In museum June 30, 1898	2,479
Discarded	87
	2,392
Received during the year	35
In museum June 30, 1899	2,427

Provisional pathological section:	
In museum June 30, 1898	2,065
Transferred to New York State Veterinary College	27
	2,038
Received during the year	25
In museum June 30, 1899	2,063

Provisional anatomical section:	
In museum June 30, 1898	895
In museum June 30, 1899	895

Photographic series:	
In museum June 30, 1898	2,266
Received during the year	46
In museum June 30, 1899	2,312

RECAPITULATION.

Specimens in the museum June 30, 1898	35,025
Discarded, transferred, etc	289
	34,736
Added during the year	303
Specimens in museum June 30, 1899	35,039

The following are some of the more interesting specimens received at the museum during the fiscal year:

11561. A white female fœtus at term, showing anencephalus and spina bifida. Contributed by Dr. William F. Walter, Washington, D. C.

11711. A duckling with but one eye; cyclops. Contributed by Mr. H. G. Johnson, Lambertville, N. J.

11559, 11560. Twin male human fœtuses, one at term and normal, the other about five months and shrunken. Contributed by Dr. G. R. L. Cole, Washington, D. C.

Perhaps the most interesting specimen of parasitic disease was:

11699. Mycetoma (fungous foot of India), consisting of the foot and part of leg of a male Mexican, living in Texas, age 45, who had been ailing twelve years; had never lived elsewhere; amputation and recovery. This is the second specimen of the kind received from Texas. The first was from Dr. Pope, U. S. A., in 1873. Only three similar specimens have been reported for the United States and Canada. Contributed by J. T. Arwine, acting assistant surgeon, United States Army.

11632. Ticks (ixodis bovis) which convey the Texas cattle fever.

11634, 11635. The spleen and kidneys from a case of chronic malarial poisoning in a man about 30 years old. The organs show marked pigmentary degeneration. Contributed by Dr. D. S. Lamb, Washington, D. C.

11620. Hemorrhage into the connective tissues of the leg of a horse; said to have been caused by an electric shock. Contributed by C. B. Robinson, veterinary surgeon, Washington, D. C.

11720. A dome-shaped skull (Thurmschädel), the shape being due to premature coössification of the sagittal and coronal sutures. From a child aged about 9 years.

11721. A very small adult skull, capacity only 900 c. c., showing also very long styloid processes.

11625. Shot fracture of skull (suicidal), Krag-Jörgensen rifle; comminution of almost every bone. Soldier. Contributed by Surg. Charles F. Mason, United States Volunteers.

11657. Shot fracture of cervical vertebræ, accidental; paralysis. A soldier. Death on second day. Contributed by Dr. J. H. Stone, assistant surgeon, United States Army.

11714. Comminuted shot fracture of bones of leg and foot, accidental; amputation. Recovery. Contributed by Brigade Surg. W. B. Banister, United States Volunteers.

11570. Comminuted fracture of sesamoid bones of horse; said to have been caused by intense spasmodic action. Contributed by Veterinary Surg. W. R. Pointon.

11659. Caries of petrosal bone, of long standing; from man about 50 years old, who had been deaf many years. In this case there was also a congenital cyst of cerebellum. Contributed by Dr. R. W. Baker, Washington, D. C.

11552, 11553. Punctured wound of heart. The heart, etc., of a boy, age 13.5 years, showing a ragged perforation in the right ventricle made by the point of a needle which had been accidentally pushed into the front of the thorax, through the thymus gland, and broken off. Death from intracardial hemorrhage on second day. Contributed by Dr. J. R. Francis, Washington, D. C.

11626, 11627. Heart, etc., showing old pericarditis and fibrous myocarditis with hemorrhage into the lungs. From a mulatto woman, age 35. Contributed by Dr. D. S. Lamb, Washington, D. C.

11568, 11569. Vegetative endocarditis with large embolic areas in spleen, some of which had become abscesses. From a colored woman, age 50. Contributed by Dr. D. S. Lamb, Washington, D. C.

11689 to 11691. Acute pericarditis, with secondary miliary abscesses in kidneys; intercurrent gastric ulcer. Cause not ascertained. From white man, age 65. Contributed by Dr. D. S. Lamb, Washington, D. C.

11704. Suppurating mesenteric gland opening by fistula into ascending colon; fatal peritonitis. From colored woman, age 20. Contributed by Dr. D. S. Lamb, Washington, D. C.

11716. Leukemic spleen; weight, 16 ounces. From colored girl, age 4 years. Contributed by Dr. C. H. Marshall, Washington, D. C.

11621. A meningocele from an infant which died on second day after birth. Contributed by Dr. S. M. Pierre, Washington, D. C.

11630, 11631. Hydrocephelas in a calf. Contributed by United States College of Veterinary Surgeons, Washington, D. C.

11658. Brain of a colored boy, 4 years old, showing a large porencephalic cavity extending into the ventricle. Contributed by Dr. G. N. Acker, Washington, D. C.

11571, 11572. Portions of brain of colored woman, age 49, showing an old apoplectic hemorrhage in the optic thalamus and a recent hemorrhage into frontal lobe and corpus striatum; an interval of seven months between lesions. Contributed by Dr. D. S. Lamb, Washington, D. C.

11682. Multiple gummata of pia mater and brain. From white man, age 48 years. Had syphilis about fifteen months. Contributed by Dr. J. F. Moran, Washington, D. C.

11696. Acute meningitis following chronic nasal catarrh. Contributed by Dr. J. H. Bryan, Washington, D. C.

Several cases of cerebro-spinal meningitis, which prevailed as an epidemic in
Washington City; 11684, from colored man, age 45, who was sick six
days, 19694, 11695, from colored man, age 40, who died on ninth day;
11701, from negro, age 50, lived five days. These specimens were con-
tributed by Dr. Lamb, and one, by Dr. G. N. Acker, 11700, from a child.

11706. Portion of spinal cord showing constriction from pressure of displaced
vertebra. From child 11 years old. There was no power of motion
in lower limbs. Contributed by Dr. G. N. Acker, Washington, D. C.

11676. Secondary cancer of pleura in a case of mammary cancer, in which the axillary glands were not involved. From mulatto woman, age 32. Contributed by Dr. D. S. Lamb, Washington, D. C.

A number of series of teeth showing anomalies and diseases were contributed, among them 11540 to 11551, by C. C. Stanley, D. D. S., Columbia, S. C.; 11576 to 11581, by Dr. Carl Klein, jr., Chicago, Ill.; 11594 to 11597, by J. F. Galentine, D. D. S., Cleveland, Ohio; 11598, 11599, by M. S. Towner,

D. D. S., New York City; 11601 to 11609, by E. M. Murlless, D. D. S., University Place, Nebr.; 11610 to 11615, by Dr. E. L. Jones, Waterville, Me.; and with models of denture, 11583 to 11592, by Henry H. Way, D. D. S., St. Thomas, Ontario.

Dental appliances were received from Dr. Charles Nevitte Gibbons, D. D. S., New Orleans, La., and Dr. Joseph Spyer, Mexico.

Among many cases of cancer of stomach one was particularly interesting, 11554, from a woman, age 70 years, in whom many years previously a cancerous cervix had been removed. Contributed by Dr. Mary Parsons, Washington, D. C.

11538. Bothriocephalus latus, the broad tape worm; from a woman who had lived all her life in Washington City. Contributed by Dr. L. A. Johnson, Washington, D. C.

11652. Operation for appendicitis and peritonitis; appendix removed. Soldier. Died. Contributed by E. R. Schreiner, assistant surgeon, United States Army.

11677. Shot perforation of jejunum, in a soldier; death nineteen hours after injury. Contributed by C. E. B. Flagg, assistant surgeon, United States Army.

11673. The small intestine containing the parasite called the Dochmius. From a dog which died of pernicious anæmia. Contributed by Cecil French, District veterinary surgeon, Washington, D. C.

Two cases of intestinal lesions in typhoid fever; one from a boy 6 years old. Contributed by Dr. S. S. Adams, Washington, D. C. The other from a soldier who died at the end of the fourth week; resolution had preceded; the patches were small and ulcers healing. Contributed by Surg. C. K. Winne, U. S. A.

11702. Cirrhosis of liver; weight, 31 ounces. From a man 55 years old. Contributed by Dr. J. Ryan Devereux, Washington, D. C.

11678. Multiple myxoma of peritoneum; viscera apparently not involved. From colored woman, age 47, who had been tapped several times for ascites; there was general peritonitis, both old and recent. Contributed by Dr. D. S. Lamb, Washington, D. C.

11682. Fused kidney, from a Russian, age 38. Contributed by Dr. D. P. Hickling, Washington, D. C.

11567. Congenital displacement of left kidney to right iliac fossa; common ureter; from an old man; no history of symptoms. Contributed by Dr. Mary Parsons, Washington, D. C.

Hydronephrosis and congenital cysts in young pigs, from Dr. George J. Lochboehler, Washington, D. C., and United States College of Veterinary Surgeons.

Two cases of pyonephrosis and calculus, 11650, and 11651, from woman, age 42 years. Contributed by Dr. R. J. S. Mauss, Washington, D. C., and 11653, from white woman, age 41, in which the kidney was removed, with recovery. Contributed by Dr. I. S. Stone, Washington, D. C.

11679. Rupture of bladder from a blow on abdomen; death three days after injury, from peritonitis, despite cœliotomy. A soldier. Contributed by Surg. A. H. Appel, United States Army.

11692. Primary melanosarcoma of prostate gland; secondary growths in pelvic and lumbar glands. From colored man, age 60. Contributed by Dr. D. S. Lamb, Washington, D. C.

11563. Cancer of testicle; excision; recovery. From a soldier, said to have been caused by bicycle. Contributed by Surg. J. M. Banister, United States Army.

11565. Fibrosarcoma of mammary gland of colored girl, age 13 years. Apparently from a blow. Excision; recovery. Contributed by Dr. E. M. Hasbrouck, Salisbury, Md.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year:

Description.	On hand June 30, 1898.	Added during fiscal year.	Total June 30, 1899.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	37,751	1,343	39,094
Medical transactions	5,899	254	6,153
Bound theses	1,965	24	1,989
Bound pamphlets	2,651	19	2,670
Other medical books	79,672	2,294	81,966
Total	127,938	3,934	131,872
Medical theses	[1] 60,953	1,202	61,948
Medical pamphlets	155,886	6,535	162,421
Total	216,839	7,737	224,369

[1] Of the total number of theses on hand June 30, 1898, there were 207 bound in 24 volumes during the year.

There were presented to the library during the year 869 books and 10,596 pamphlets and journals.

Volume IV, second series, of the Index Catalogue, includes the letter "D" and the letter "E" to "Emulsion," and forms a volume of 917 pages. It will be ready for distribution at the usual time. The appropriation for Volume V, second series, having been made, the manuscript is in course of preparation for the printer.

MEDICAL OFFICERS.

An army medical board, convened by Special Orders, No. 51, Adjutant-General's Office, March 3, 1898, examined 97 candidates during its sessions from May to July. Thirteen of these were approved, 16 were rejected as disqualified physically, 57 as disqualified professionally, and 11 withdrew after partial examination. A second board, convened by Special Orders, No. 210, Adjutant-General's Office, September 6, 1898, examined 80 candidates, of whom 21 were approved, 26 rejected on professional and 27 on physical grounds, and 6 withdrew after partial examination.

Appointments.—Thirty-three assistant surgeons with the rank of first lieutenant.

Promotions.—Three surgeons with the rank of major, to be deputy surgeons-general with the rank of lieutenant-colonel; 6 assistant surgeons with the rank of captain to be surgeons with the rank of major; 6 assistant surgeons with the rank of first lieutenant to be assistant surgeons with the rank of captain.

Deaths.—One surgeon with the rank of major; 2 assistant surgeons with the rank of captain; 1 assistant surgeon with the rank of first lieutenant.

Retirements.—Two deputy surgeons-general with the rank of lieutenant-colonel, by operation of law, under the provisions of the act of Congress approved June 30, 1882; 1 deputy surgeon-general (thirty years' service) with the rank of lieutenant-colonel, and 1 surgeon with the rank of major (thirty years' service); 2 surgeons with the rank of major, and 1 assistant surgeon with the rank of captain, on account of disability. *Wholly retired.*—One assistant surgeon with the rank of captain.

Resigned.—One assistant surgeon with the rank of first lieutenant.

On June 30, 1899, there were in the service 191 medical officers, the number allowed by law being 192.

Surgeons United States Volunteers.—During the year 140 officers of the United States Volunteers were appointed, 11 as lieutenant-colonels, and 129 as majors in the Medical Department. Forty-five of the appointees were from the Regular Army and 95 from civil life. At the end of the year there remained in service 34 majors and surgeons, 12 of whom were captains in the regular establishment.

Contract surgeons.—On July 1, 1898, 156 surgeons were on duty under contract and 784 contracts were made during the year, making a total of 940. Of this total 546 contracts were annulled during the year, including 8 on June 30, 1899, and 9 contract surgeons died while in service, leaving 385 under contract on July 1, 1899.

THE ARMY MEDICAL SCHOOL.

This school was closed during the school year, 1898–99, as the important duties imposed on medical officers by the existing war conditions left them no opportunity to carry out the usual school programme.

THE HOSPITAL CORPS.

After the declaration of war with Spain the authorized increase of the Regular Army and the muster in of volunteer troops necessitated a corresponding increase of the hospital corps. To hasten this increase of the corps and to utilize the services of suitable men already in the volunteers, General Orders, No. 58, Adjutant-General's Office, May 31, 1898, provided that enlisted men of volunteer organizations could be transferred to the hospital corps of the Regular Army by the commanding general of an army corps upon the recommendation of the chief surgeon. The corps commander was also given full control of the enlistment, reenlistment, and discharge of members of the hospital corps and the detail of acting hospital stewards, and the provisions of army regulations which conflicted with this order were suspended during the existence of the war. A large number of privates were transferred under this order, most of whom were untrained in hospital-corps duties. By General Order 178, Adjutant-General's Office, November 8, 1898, the authority over the hospital corps given to corps commanders was extended to commanders of military departments outside the limits of the United States. This order was reaffirmed in a slightly different form by paragraph 2, General Order 86, Adjutant-General's Office, May 2, 1899, in which the provision of the original order, which limited its operation to time of war, was omitted. Paragraph 2, General Orders, No. 40, Adjutant-General's Office, May 10, 1898, announced that men enlisted or reenlisted in the Regular Army during the war would be granted their discharges if desired at the close of the war; and Circular 45, Adjutant-General's Office, October 27, 1898, provided that privates of the hospital corps, who had been transferred from volunteer regiments, might be discharged if they so requested at the time their respective regiments were mustered out.

By June 30, 1898, the hospital corps had increased to 133 hospital stewards, 172 acting hospital stewards, and 2,940 privates, most of the privates having been gained by transfers from the line. November 30, 1898, the corps attained its maximum strength—163 hospital stewards, 445 acting hospital stewards, and 5,980 privates, a total of 6,588. After this the force gradually decreased, mainly through the discharge of men enlisted for the war only, until on June 30, 1899, the force present was 189 hospital stewards, 287 acting hospital stewards, and 2,892 privates, a total of 3,368.

The gain to the corps during the fiscal year was 6,185—3,465 by enlistment and 2,720 by transfer. The loss aggregated 6,062 men, 5,086 of whom were discharged by order and only 201 by expiration of term of service. It is of interest to note that 106 died by disease, 4 were killed in action, 6 died of wounds, and 158 were discharged for disability.

For the year from April 30, 1898, to April 30, 1899, the gain to the corps by enlistment and transfer amounted to 8,016 men, while the gain for the year ending June 30, 1897, was only 276. The changes of status of members of the hospital corps in twelve months were increased nearly twenty-four fold on account of the war conditions; in fact, they were nearly as great as those occurring in the entire Army during the time of peace, for in the fiscal year 1896–97 the gain to the Army, exclusive of the hospital corps, amounted only to 8,748.

Paragraph 3, General Orders No. 178, Adjutant-General's Office, November 8, 1898, allowed a volunteer regiment, in addition to the 3 regimental hospital stewards provided by law, 1 acting hospital steward, 6 privates of the hospital corps as attendants, 1 private as cook, and 1 for each ambulance and wagon, making an average allowance of 12 privates. This order was revoked by General Orders, No. 86, Adjutant-General's Office, May 2, 1899, most of the volunteer regiments having been by that time mustered out, and the allowance to a (regular) regiment serving without the United States was fixed at 1 hospital steward, 3 acting hospital stewards, and 12 privates.

Hospital stewards.—Prior to the war there were in service 100 hospital stewards, the number provided by the act of March 16, 1896. This number was increased to 200, and the requirement of service for twelve months as acting hospital steward prior to appointment as hospital steward was suspended during the continuance of the war. General Orders, No. 58, Adjutant-General's Office, May 31, 1898, gave authority to the commander of an army corps or of an independent division to appoint hospital stewards from acting hospital stewards, after three months' service, when they were recommended by their medical officers and approved by a board of not less than three medical officers. Under the provisions of this order, 44 hospital stewards were appointed by corps commanders. In August, 1898, 13 acting hospital stewards were examined, under the direction of the Surgeon-General, of whom 10 were found qualified and immediately appointed, and in November 65 were examined, of whom 34 were appointed.

The act of March 3, 1899, authorized the increase of the Regular Army to 65,000. It was at first held that this act repealed the provisions of the act of March 1, 1887, which provided that the hospital corps should not be included in the effective strength of the Army, and that this corps was, therefore, included in the 65,000 men. An allowance was published in General Orders, No. 37, Adjutant-General's Office, March 9, 1899, fixing the number of hospital stewards at 175, acting hospital stewards at 325, and privates at 2,100, a total of 2,600 men, or 4 per cent of the total strength. It was, however, decided by the Judge-Advocate-General and the Comptroller of the Treasury that the provisions of the act of March 1, 1887, were not affected by this legislation, and that therefore the hospital corps was not included in the 65,000. This decision removed the limitation as to the number of acting hospital stewards and privates, but the number of hospital stewards, increased by the act of June 2, 1898, only during the existence of the war, reverted to that fixed by the act of March 16, 1896. It will not, therefore, be possible to appoint additional hospital stewards until the number in service shall become less than 100. This is to be regretted, as it impairs the efficiency of the corps by preventing the promotion of men of merit and long service and deters able and ambitious young men from enlisting.

Ten hospital stewards were allowed each army corps by General Orders, No. 82, Adjutant-General's Office, June 27, 1898. The same order authorized the detachment of volunteer hospital stewards from their regiments and their assignment to duty at the discretion of corps commanders. By thus making use of the services of these men the needs of field and general hospitals for noncommissioned officers were in a measure supplied, but chief surgeons frequently reported on their inexperience and incapacity.

Acting hospital stewards.—Paragraph 1397, Army Regulations, which provides that a private must serve one year in the hospital corps before he can be detailed acting hospital steward, was so amended by paragraph 3, General Orders, No. 20, Adjutant-General's Office, January 27, 1899, as to require but three months' service as private previous to detail as acting hospital steward, because of the need of a greater number of these noncommissioned officers and the desirability of utilizing the services, in this capacity, of privates qualified to perform the duties by virtue of previous training in medicine, pharmacy, or nursing.

Paragraph 1409, Army Regulations, provides that at every post there will be at least one hospital steward, and at every post of two or more companies there will also be an acting steward, if practicable. The limited number of hospital stewards has, however, rendered it impossible to comply with this regulation. On June 30, 1899, there were in the United States 36 garrisoned posts, in Cuba 12, and in Porto Rico 13 posts with no hospital steward, the place of the stewards in these instances being taken by acting hospital stewards, on whom were imposed duties and responsibilities without corresponding rank and pay.

School of instruction.—Systematic teaching in the Hospital Corps School of Instruction at Washington Barracks, D. C., was practically suspended during the war. Recruits and transferred men received practical training as nurses at the general hospitals. Washington Barracks served as a depot for detachments of men who were collected for service in the camps in the United States, the West Indies, and the Philippines. From April 30, 1898, to September 30, 1899, 1,510 men passed through this school of instruction, an average of 88.8 men per month. The estimated average length of stay was about two weeks. Since the return of more settled conditions systematic instruction has been resumed. A similar school is being organized at Angel Island, California, with a view to give as much instruction as possible to hospital-corps men collected there for transportation to the Philippines

Instruction in cooking.—At the larger hospitals in this country, and in Cuba and Porto Rico, the preparation of food for the sick is intrusted to civilian cooks or to female nurses in charge of the diet kitchen. In the Philippines, however, the conditions are such that women can not safely live at the interior posts. It is, therefore, important that some members of the hospital corps should have a knowledge of such cooking. I have accordingly instituted a course of instruction in cooking at the school at Washington Barracks. This course has been under the immediate charge of Miss Elizabeth Stack, graduate of St. Mary's Hospital, Brooklyn, N. Y., who has rendered excellent service. The following reports, dated, respectively, September 12 and 17, 1899, from Capt. E. L. Munson, assistant surgeon, U. S. A., in charge of the Hospital Corps School, show the nature and scope of this instruction:

I. I have the honor to submit for your information the accompanying plan for guidance in instruction in cooking at the school for the hospital corps at this post. It contemplates a series of fifteen lessons, of which twelve are progressive and three are reviews, extending over a period of three weeks, it being understood that under present conditions recruits would scarcely remain at this school longer than one month.

The character of the work, which is entirely practical, is outlined under the supposition that the cooking for the sick such as the average hospital corps man may be expected to perform will be largely of an emergency character, with isolated and small commands and under conditions where supplies will be but limited in variety. The object of the instruction, therefore, would seem to be, first, to educate the recruit in the preparation of the various articles of the several rations, so as to render them more delicate, appetizing, and suitable for the use of the sick; second, in the employment of the five articles which it is anticipated will constitute the hospital stores under the revised supply table for the Medical Department; third, in the preparation in simple combination of eight additional articles selected for their nutritive value, suitability for the sick, ease of preparation, palatability, and probable availability in the field or at isolated stations.

These additional articles are fresh milk, eggs, oatmeal, farina, chicken, canned soups, gelatine, and fresh fruits. From the components of the ration, hospital stores, and the few extra supplies named eighty-six palatable and nutritive preparations or combinations may be made, and this number, it is believed, will prove sufficiently ample under all conditions. The careful drilling of the men in making the most of the few articles which they are practically certain to have on hand is thought to be more advisable than to undertake the prolonged study of a large number of foodstuffs, which, while eminently desirable, would probably be unavailable under the circumstances in which the members of the hospital corps would be called upon to act as dietists.

Courses in dietetics, hospital corps, company of instruction, Washington Barracks, D. C.

First day.—Liquid diet:	
(*a*) Milk	Sterilized. Milk punch. With mineral water. Albuminized.
(*b*) Milk, peptonized	Cold process. Warm process.
(*c*) Rennet	Whey. Junket.
Second day.—Liquid diet:	
Gruels	Oatmeal. Farina. Rice. Hard bread. Arrowroot.
Third day.—Liquid diet:	
Drinks	Lemonade. Orangeade. Eggnog. Egg lemonade. Sherry and egg. Toast water. Coffee. Tea.
Fourth day.—Liquid diet:	
Broths	Beef juice. Beef juice, bottled. Beef tea, bottled. Beef tea with hydrochloric acid. Beef broth. Mutton broth. Chicken broth.
Fifth day.—Review.	
Sixth day.—Light diet:	
(*a*) Canned soups	Chicken. Mutton. Beef. Clam broth.
(*b*) Eggs	Poached. Cooked. Boiled. Omelet. Custard.

Seventh day.—Light diet:	
(*a*) Toast	Dry. Milk.
(*b*) Oatmeal	Porridge. Mush.
(*c*) Farina	Porridge. Mush.
(*d*) Rice	Plain boiled. Steamed.
(*e*) Rice flour	Milk porridge.
Eighth day.—Light diet:	
(*a*) Gelatine	Lemon jelly. Coffee jelly. Wine jelly.
(*b*) Dried fruit	Stewed. Baked.
(*c*) Fresh fruit	Stewed. Baked.
(*d*) Canned fruit	Serving of.
Ninth day.—Light diet:	
(*a*) Potatoes	Baked. Roasted. Boiled. Mashed.
(*b*) Beef	Scraped. Broiled.
(*c*) Chicken	Stewed. Minced on toast.
Tenth day.—Review.	
Eleventh day.—The hospital stores:	
(*a*) Beef extract	Bouillon. Used as an addition to soup.
(*b*) Malted milk	As food.
(*c*) Chocolate	As food. As flavoring.
(*d*) Arrowroot	Blanc mange.
(*e*) Condensed milk	General uses of.
(*f*) Sugar	General uses of.
Twelfth day.—The ration:	
Field minimum Travel Emergency	General uses of.

Courses in dietics, hospital corps, company of instruction, etc.—Continued.

Twelfth day.—The ration—Continued.

(*a*) Hard bread	General uses of. Toasted. Toast water. Hard bread gruel. Hard bread mush. Hard bread as milk toast. Brown betty (hard bread and dried apples).
(*b*) Bacon	General uses of. Broiled. Fried. Boiled.

Thirteenth day.—The ration:

(*a*) Canned roast beef	Soup. Stew Hash.
(*b*) Canned salt beef	Stew. Hash.

Fourteenth day.—The ration:

(*a*) Rice	Pudding.
(*b*) Baked beans	Soup.
(*c*) Peameal	Soup. Mush,
(*d*) Tomatoes	Soup. Stewed. Baked.

Fifteenth day.—Review.

II. In compliance with verbal request from your office for information with regard to the work of the cooking class of this company of instruction, I have the honor to submit the following facts:

1. For convenience of instruction the men are divided into squads of ten to eighteen men each, the number of squads and the number of men in each squad naturally varying with the strength of the command. If less than fifty men are present for duty, there are three squads and the cooking class does not conflict with drill. If more than that number are under instruction the fourth squad is organized and the hours are rotated, according to the accompanying schedule, so that each man gets at least four hours of marching and litter drill weekly.

2. Each class in cooking is graduated at the end of three weeks from the general course, which covers fifteen lessons of one hour each. Record is kept of the proficiency of each man, and it is intended to detail a limited number of the men who manifest special aptitude and interest in cooking for a short tour of duty in the general kitchen.

3. Experience has shown that not more than fifteen to eighteen men should compose a cooking squad. If at any one time more than sixty-five to seventy-five men require instruction in this subject, assistance to the present instructress of cooking will be necessary.

4. Each squad is divided into smaller sections for purposes of instruction. Four gas stoves and one range are now in use and this implies division into subsections of three or four men each.

5. The work throughout is entirely practical; knowledge of the subject being gained by experience, by object lessons, and by such comments or criticisms on the part of the instructress as may from time to time be required.

6. Each section works together. The men may communicate about the work and are encouraged to ask questions. Order is insured by the presence of an acting hospital steward during each hour of instruction. With but few exceptions the men realize the importance of the work and manifest due interest therein—a fact probably largely due to the energy and personality of the instructress.

CONTRACT NURSES.

The value of the services of female nurses has been recognized in a practical way by most military nations since the time of the Crimean war, when Miss Florence Nightingale and her corps of patriotic women aided in caring for the sick and wounded in the hospitals at Scutari. In the armies of Europe provision is made for the assignment of a certain number of trained female nurses, or sisters of religious orders, at large permanent military hospitals; and since the Geneva convention the nurses furnished by the National Red Cross and other aid societies have served in time of war in hospitals at the base of military operations.

During our civil war female nurses, many of them Sisters of Charity, served at many of the large general hospitals. A few who had special ability, intelligence, and experience were employed in nursing particular cases; but male help was preferred in the general wards, and the sphere of the women was usually restricted to the extra diets and supervision over the linen, the laundry, and the contribution room.

Since then, however, the systematically educated and trained female nurse has been developed by the medical profession to insure expert attendance on the patient during the absence of the physician or surgeon. There is a large number of such educated women in the United States at the present time, and they did not hesitate to offer their services to the Government during the recent war.

The emergency which rendered their services acceptable was the product of two causes: First, the inability of the Medical Department of the Army to enlist in a few weeks 6,000 or more men qualified by previous experience to perform certain important duties, or indeed to enlist that number of inexperienced but intelligent men, with the intention of training them subsequently. Second, the epidemic prevalence of typhoid fever in our camps.

When war was declared April 21, 1898, there were in service in the Hospital Corps 791 noncommissioned officers and privates, all well disciplined and proficient. These barely sufficed for the medical service of the Regular Army, then on its peace footing, with a strength of about 28,000. Suddenly authority was given to increase the Army to ten times this number. Patriotism speedily filled the ranks of the companies, and regiment after regiment was mustered into service, but no energy on the part of the Medical Department could raise a corresponding number of trained men for the Hospital Corps. To help this office out of its difficult position authority was given to transfer men from the line for hospital duty, but as I explained in my last annual report (page 121) soldiers of volunteer regiments did not care to sever their local connections for service in the Hospital Corps of the Regular Army, and the officers of these regiments were naturally disinclined to transfer their best and most intelligent men to another command. However, by enlistment and transfer from the line a large number of men was hastily added to the Hospital Corps. Most of them were untrained in hospital work and many were unfitted for duties of this character. About this time the infection of typhoid fever spread throughout our camps and filled the field division hospitals with men seriously sick. These hospitals had been organized as mobile establishments to follow the troops from camp to camp and from battlefield to battlefield during the progress of a campaign, but this sudden prevalence of a dangerous and protracted fever immobilized them. The medical officers in charge had to cease their preparations for active service and devote the whole of their energies to the care of the sick. In doing this their hospitals ceased to be field division hospitals in all except in name. They became expanded and equipped without regard to mobility or campaigning.

Trained nurses were required to care for the large number of sick in these hospitals. The Hospital Corps had in its membership many men whose services were invaluable at this time, but there was not a sufficient number of such men for the occasion.

I had already as early as May 10 made contracts with female nurses for service in general hospitals, and in July many were on duty in the hospitals of General Shafter's army at Santiago de Cuba. During the prevalence of typhoid fever in our camps I increased the number of female nurses and placed them on duty, not only in the general hospitals, but in the division and post hospitals and in such regimental hospitals as required their services. The number reached a maximum of 1,158 on September 15. After this date the suppression of the typhoid epidemic and the muster out of volunteer regiments rendered so large a nursing force unnecessary. Contracts were annulled and on July 1, 1899, there remained in service only 202—65 in the United States, 76 in Cuba, 9 in Porto Rico, 38 in the Philippines, 6 in Honolulu, and 8 on the hospital ship *Relief*. The total number of female nurses with whom contracts were made was 1,563. Among them there were reported 140 cases of typhoid fever; 12 fatal. One nurse died of yellow fever.

American women may well feel proud of the record made by these nurses in 1898–99, for every medical officer with whom they served has testified to their intelligence and skill, their earnestness, devotion, and self-sacrifice.

The contract nurses now in service have been organized into a female nurse corps under the superintendence of Acting Asst. Surg. Anita Newcomb McGee. The corps consists of chief nurses, nurses, and reserve nurses. Regulations governing their appointment and defining their duties, pay, and privileges were issued from this office as follows:

CIRCULAR.] WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, June 20, 1899.

The following regulations governing the female nurse corps of the army are published for the information and guidance of all concerned:

The nurse corps shall consist of chief nurses, nurses, and reserve nurses.

The Surgeon-General may assign female nurses to duty at all army hospitals where the cases treated are of such character as to require the care of trained nurses. Under ordinary conditions not more than two will be assigned to a hospital having less than twenty beds.

A medical officer requiring the services of female nurses at a hospital will make application to the Surgeon-General, through the chief surgeon. (See paragraph on "Transfers.")

At each hospital to which nurses are assigned one of them shall be a chief nurse, appointed by the Surgeon-General.

Women not under army contract will not be permitted to serve as nurses in army hospitals unless in an unforeseen emergency, and in such case the medical officer in charge of the hospital will immediately report the fact to the Surgeon-General for his action.

APPOINTMENT.

To be appointed in the Army a nurse must be qualified therefor, physically, mentally, and morally, as hereinafter provided:

1. She must present a physician's certificate of health on a blank form which will be furnished by the Surgeon-General.
2. She must be a graduate from a training school for nurses which gives a thorough professional education, both theoretical and practical, and requires at least two years' residence in a hospital.
3. She must be indorsed by the present superintendent of nurses at the hospital from which she graduated and also by the one under whom she was trained. Blanks for these indorsements will be furnished by the Surgeon-General and are to be returned directly to him.

These provisions may be waived in whole or in part in the cases of dietists, of immunes to yellow fever, and of nurses who have rendered satisfactory army service during the Spanish-American war.

TERM OF SERVICE AND ANNULMENT OF CONTRACT.

When a nurse on the eligible list is appointed for active service, she signs a contract to serve for at least one year, unless sooner discharged.

Immunes (non-graduate nurses) appointed to nurse special diseases or to meet special conditions will not be required to sign for any definite length of time.

When appointed, a nurse is considered as on probation regarding her fitness for army duty and if not found acceptable will be recommended for annulment of contract by the chief nurse. Such recommendation, approved or disapproved by the medical officer in charge of the hospital, will be forwarded to the Surgeon-General.

A nurse on duty outside of the United States whose services are not needed will be given written orders to proceed to her home, and the medical officer requesting or issuing such orders will immediately forward a copy to the Surgeon-General, stating in full the reason for his action. He will indorse on the nurse's contract the date of the order and the date to which she was last paid, and direct her, on arrival home, to forward it to the Surgeon-General and report for annulment of contract or orders. In reporting she will state the date of her landing in the United States. If a nurse prefers not to return home, her contract may be annulled by the chief surgeon without the issuance of such orders: such action to be immediately reported to the Surgeon-General.

The contract of a nurse will not be annulled at her own request except for good reason, presented in writing and forwarded to the Surgeon-General through the chief surgeon. If on duty outside the United States the chief surgeon may, at his discretion, order her home to report to the Surgeon-General for annulment of contract, as above provided.

The contract of a nurse on duty in the United States whose service has been entirely satisfactory will not be annulled except by authority of the Surgeon-General.

PAY.

For service in the United States a nurse will be paid $40 a month, and in Cuba, Porto Rico, the Hawaiian Islands, or Philippine Islands, $50 a month.

All chief nurses receive the same allowance as nurses, and where less than five nurses are constantly serving at a hospital the chief nurse does not receive increased pay. Where five or more and less than ten are constantly serving, the chief nurse receives $10 a month more than the nurses. Where ten or more are constantly serving, she receives $25 a month more than the nurses.

Accounts for the pay of contract nurses will be prepared by the officer under whose direction they may be serving, upon vouchers (Form 4) in duplicate, properly certified by the officer in charge and signed by the nurse and forwarded to a disbursing officer for settlement. No payments to nurses will be made on pay rolls.

Vouchers will be prepared and forwarded at the end of each month, upon the annulment of contract, upon transfer to another station and upon departure on leave of absence or by order; the date of last payment and by whom paid will be stated on each voucher, and upon final voucher the date of annulment of contract.

In preparing vouchers the officer will certify only as to time of service and amount due the nurse while said nurse has been on duty at the hospital under his charge; except that upon the presentation of an order for transfer to said hospital, or a leave of absence from which a nurse has returned (if said leave of absence is with pay), the officer will take up on the voucher and credit the nurse with the amount due for the period covered by said order or leave of absence.

The nurse's copy of her contract will in all cases accompany vouchers when presented for payment, and will be returned to her with the check when received from the disbursing officer.

Disbursing officers will note all payments on the contracts of nurses, and will forward to this office, on information slip, the name and amount paid to each, and for what period paid.

Disbursing officers must be careful not to make payments in advance.

New contracts (in quadruplicate) will be made with each nurse when for any reason the rate of pay is changed, two copies to be forwarded to this office, with the oath, one copy to be given to the nurse, and one to be retained by the officer making the contract. The Christian names and surname of the nurse must be given in the contract, and her signature must correspond therewith.

TRANSPORTATION.

A nurse can not leave her station except when ordered to do so or when granted a leave of absence.

Before starting on a journey at public expense she must receive a written order from the proper authority, together with an order for her railway ticket and sleeper (or accommodations on a transport or other vessel). She must also have the date of the order and the time to which she was last paid indorsed on her contract.

When traveling under orders no delay in starting and no stop-over privileges are allowed.

A nurse returning from service outside of the United States will usually be furnished transportation to New York or San Francisco. On arrival in either city she will proceed to the Army Building, where, on presentation of her travel order, she will be furnished transportation to her destination.

On annulment of contract a nurse is given orders and transportation to her home unless she waives her claim thereto. No transportation can in any case be furnished after annulment.

Transportation will not be furnished for any journey which a nurse may take while on leave of absence, except that if she goes to and from the United States she may, if practicable, be authorized to travel on a Government transport.

Nurses, whether still in the service or not, will be reimbursed either by the Quartermaster's Department or by the Auditor for the War Department for incidental expenses incurred in any journeys under orders. An itemized account, not to exceed $2 for each day of travel, must be prepared in duplicate and certified to before a notary. Blank No. 13, Quartermaster-General's Office, may be used for this, and the notary's fee be added to the account.

When possible, receipts for expenditures are to be appended, and the whole is to be forwarded to the Quartermaster-General, War Department, Washington, D. C., or to the nearest quartermaster for settlement. In all cases the nurse must furnish her copy of the order in obedience to which she traveled, and if she was not given such copy (or has mislaid it) she must obtain it by application to the officer who directed her return home. This application may be inclosed in an envelope addressed to the Surgeon-General of the Army, who will forward it to the officer for compliance with her request. Expense for sleeping-car berths incurred prior to September 20, 1898, will not be refunded.

LEAVE OF ABSENCE.

The total duration of leave of absence with pay granted a nurse shall not exceed thirty days for each year of service.

The Surgeon-General or chief surgeon of a military department or of an army corps, or the commanding officer of a general hospital, or surgeon in charge of a hospital, may grant leaves of absence to a nurse when it can be done without detriment to the service. No leave of absence will be granted unless requested by the nurse in writing. The nurse must furnish her copy of contract on which the length of leave of absence, if granted, and whether with or without pay, will in all cases be indorsed. The officer will give to the nurse the paper granting the leave of absence and will report the facts to the Surgeon-General on information slip.

When a leave of absence is granted to a nurse on insular service, the time which may be spent in traveling to and from the United States will not be counted.

When a leave of absence is due a nurse whose services are no longer required she will be ordered to her home to await annulment of contract at expiration of leave of absence. If furnished transportation she is not entitled to commutation of rations for the period occupied in making the journey. A nurse whose contract is annulled at her own request or because of unsatisfactory service forfeits claim to any leave of absence which may be due her, except as specified in paragraph on "Illness."

At the close of her leave of absence a nurse must report in person at her station, if in the United States, otherwise to the Army Building at the port from which she is to embark for her station. A nurse whose services are no longer needed at the hospital where she is stationed will, when granted a leave of absence, be ordered to report to the Surgeon-General, in writing, at least one week before its expiration. She will then be transferred or her contract annulled, according to the necessities of the service at that time.

Special leaves of absence without pay may be granted under exceptional conditions, but shall not exceed thirty days at any one time, unless by authority of the Surgeon-General. At places where the services of trained nurses are not otherwise obtainable a nurse may, if she so desires, and with the approval of the medical officer in charge of the hospital, be granted leave of absence without pay in order to take a private case.

An extension of leave of absence may be granted by the same officer and under the same conditions as the original leave of absence.

NOTE.—Each medical officer in charge of a hospital will be furnished with a statement as to the amount of leave of absence due each nurse serving under him on July 1, 1899; such statement to be indorsed by him on the nurse's contract.

ILLNESS.

A nurse is entitled to receive medical attendance and care when ill. This will be provided for at each hospital so far as possible, but when it is reported as desirable the Surgeon-General (or chief surgeon within his department) may give orders for a nurse's transfer to and treatment in some other Army hospital. Bills contracted by a nurse for medical attendance can not be allowed, nor will extra leave of absence with pay be granted because of illness.

The contract of a nurse who becomes ill while in the service will not be annulled during such illness, unless at her own request, but in the latter case she may be ordered to her home and granted whatever leave of absence may be due her before her contract is annulled.

TRANSFERS.

When the necessities of the service require it, nurses will be transferred from one hospital to another. A nurse ordered to duty outside of the United States will usually be expected to remain a year. Orders for transfers will be issued by the Surgeon-General, except that where a chief surgeon has jurisdiction over more than one hospital he may order transfers between them, reporting the fact immediately to the Surgeon-General.

QUARTERS.

Nurses will be furnished rooms or tents for sleeping, according to the accommodations available at each hospital, and where there are several nurses one room or tent will be provided as a common sitting room.

Sheets, towels, pillowcases, and other washable articles furnished by the hospital for the nurses' use will be washed as part of the hospital laundry.

RATIONS.

A nurse is entitled to one ration in kind.

Nurses will be served in a separate dining room. if possible, and if their number warrants it; otherwise at different hours from men using the same room. They are entitled to the use (and laundry) of table linen which is supplied to hospitals.

A nurse while on leave of absence will be allowed commutation of rations at the rate of 25 cents a day. To obtain this she must apply to the Commissary-General of Subsistence, United States Army, War Department, Washington, D. C., or to any commissary officer. In any case she must furnish her official leave of absence, which is to be retained by the officer making the payment. This does not apply to leaves of absence prior to October 17, 1898. Nurses who may be entitled to reimbursement for traveling expenses are not entitled to commutation of rations for the period occupied in making the journey.

REPORTS AND RETURNS.

If the nurses assigned to any hospital are too few or too many, the medical officer in charge thereof will report that fact to the Surgeon-General.

Every change in the status of nurses, such as arrival, departure, leaves of absence granted, orders given, death, etc., will, on the day of its occurrence, be reported to the Surgeon-General by the medical officer in charge of a hospital. Information slips will be used for this purpose, giving Christian names and surname in each instance.

On the last day of each month the medical officer in charge will forward a return of female contract nurses to the Surgeon-General, through the Chief Surgeon, on blank form furnished by this office.

He will forward directly to the Surgeon-General the efficiency reports prepared by the chief nurse, and will indorse thereon his remarks and a report as to the efficiency of the chief nurse. If there is lack of harmony between the nurses and the chief nurse, it should be reported.

UNIFORM.

Within two months after her appointment in active service, or after receipt of this circular, each nurse will provide herself with the prescribed nurse's uniform of army blue and white. This must be made in accordance with instructions to be issued by the Surgeon-General, and is always to be worn during a nurse's hours of duty. A nurse provides for the laundry of her uniforms.

The enameled badge of the nurse corps will be worn by a nurse, either pinned on the left side of the collar of her uniform or on a corresponding part of her dress when she is not in uniform.

Exceptions to the rules regarding uniform may be made by the Surgeon-General when deemed desirable.

DUTIES OF A NURSE.

A nurse will study and conform to the rules of military discipline and obey strictly and without delay any order which may be given her by her superior officers or her chief nurse.

When required by the climate the chief nurse may, with the approval of the medical officer in charge, substitute the eight-hour day for the usual ten or twelve hours of ward duty.

If a hospital is large enough to require it, one or more nurses may be assigned to duty as assistants to the chief nurse, and if several nurses are on night duty, one will act as chief night nurse.

A nurse will not receive presents from patients or from the relatives or friends of patients.

A nurse must carefully preserve her copy of contract and present it to the proper officer for indorsement whenever she is paid, or given orders, or granted leave of absence, or her contract is annulled.

DIETIST.

When appointed for duty as a dietist, or when assigned to duty as such, a nurse will have the supervision, under the direction of the medical officer, of the preparation of food intended for patients unable to eat the usual ration. She may also be required to herself prepare such food, or to instruct enlisted men in its preparation, or to attend to the drawing of rations or preparation of food for the nurses, or to perform such duties as may be assigned to her by the chief nurse, with the approval of the medical officer in charge; the whole to be regulated by the size and requirements of each hospital.

CHIEF NURSE.

The Surgeon-General will appoint as many chief nurses as may be necessary, by promotion from the grade of nurse; such appointees to be reduced if unsatisfactory or if a less number of chief nurses are required.

If at any hospital one (or more) of the nurses proves herself possessed of marked executive ability, good judgment, and tact, she may be recommended for promotion by the chief nurse and medical officer in charge.

When a vacancy occurs, an eligible nurse will be appointed chief nurse by the Surgeon-General.

Duties.—The position of chief nurse is, so far as army conditions permit, equivalent to that of a superintendent of nurses in a civil hospital. It is her duty to supervise the ward work of the nurses and see that it is kept up to the highest standard, to regulate the nurses' hours and assign each to her specific duty. She will attend to their comfort and welfare, and see that they receive proper attention when ill; and will be responsible for their dignified and discreet conduct. She may make such rules for them as are approved by the medical officer in charge, and will see that the provisions of this circular and the directions of the medical officer are faithfully carried out.

The chief nurse will render efficiency reports of the nurses serving under her on the last day of March, June, September, and December of each year, for which purpose blanks will be furnished. A similar report will be made when she is about to leave a hospital, and whenever she may consider it desirable or it may be ordered by the Surgeon-General. Special efficiency reports of an individual nurse will be made whenever she is ordered away from the hospital, or whenever the chief nurse deems it desirable.

In smaller hospitals, according to the circumstances in each, the surgeon may assign her additional duty, either in the wards or in charge of the linen room, or as dietist.

She will familiarize herself with the Army Regulations and the Manual for the Medical Department, so far as they affect her duties, and will keep copies of these books for consultation by the nurses.

All reports will be addressed to the Surgeon-General and forwarded through the medical officer in charge. Any communication requesting or involving the issuing of orders is official, and will follow the same channel.

RESERVE NURSES.

A certain number of nurses who have rendered at least four months' satisfactory service in the Army will be appointed reserve nurses.

Each reserve nurse will sign an agreement to enter active service wherever required, and to report by letter to the Surgeon-General on the 1st of January and the 1st of July of each year, and at other times if required. Reserve nurses wear the badge of the army nurses, but are not paid except when on duty.

When assigned to active duty, they will be subject to all established rules and regulations, and will receive the pay and allowances of nurses on the active list. They will sign contracts in which no definite term of service is specified. On returning to her home from active duty a reserve nurse will be granted eight days' leave of absence with pay, in addition to that to which she may otherwise be entitled.

A nurse will be dropped from the reserve list upon reaching the age of 45 years, or if she ceases for five years to practice her profession, or if she becomes incapacitated from ill health, or for any other good and sufficient reason. But a nurse shall not be dropped from the reserve list without information being furnished her of the cause for such action and an opportunity being given her to reply to any charges which may have been made against her.

The receipt of this circular will be acknowledged by information slip.

Geo. M. Sternberg,
Surgeon-General, United States Army.

Approved.
G. D. Meiklejohn,
Acting Secretary of War.

RECRUITING.

The total number of men examined for enlistment in the Regular Army during the calendar year 1898 was 71,250—white, 66,237; colored, 5,013. The number accepted was 54,896, or 770.47 of every thousand examined. The ratio of accepted men was 770.79 for the white and 766.21 for the colored. White men to the number of 22.74, and colored men to that of 16.75, per thousand declined enlistment. The rate of rejections on primary examination was 206.47 among the white, and among the colored candidates 217.04, giving a mean of 207.21.

Of every thousand examined, 60.35 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight; 34.81 for diseases of the eye, 26.37 for diseases of the circulatory system, 20.20 for diseases of the genito-urinary system, 11.87 for diseases of the digestive system, 9.71 for venereal diseases; while 4.29 were rejected on account of bad or doubtful character or unsatisfactory references, 4.38 as generally unfit or undesirable, and only 1.75 on account of illiteracy, imperfect knowledge of the English language, and mental insufficiency.

Among the recruits who fill up the ranks of our Regular Army there is usually a considerable number of men who are not native born. A few years ago Irish and German recruits constituted one-fifth of the total number accepted, or 200 of every thousand men. Recently the proportion of the foreign born has been decreasing. In 1895 the ratio for each of these two classes of foreign-born recruits fell for the first time below 90 per thousand. In 1897 Germany furnished 74.53 and Ireland 74.30. During the past year, as a result of the military spirit pervading the country, the ratio of the native born rose to 770.47 per thousand, while the proportion of naturalized citizens of German and Irish birth fell respectively to 47.98 and 34.74 per thousand.

Recruiting returns for volunteers were not rendered to this office.

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

During the year ending June 30, 1899, 1,667 transcripts of the identification cards of 810 delinquent ex-soldiers were filed among the classified descriptions of undesirable men, an average of 2.06 per man, as compared with 2.19 for the antecedent period, and 193 transcripts were canceled. On June 30, 1899, there remained 33,968 transcripts, an average of 2.35 each for 14,447 delinquent soldiers whose enlistment would be contrary to law.

June 30, 1898, 95,065 identification cards were on file for recruits and 4,808 for released military convicts and soldiers discharged dishonorably or without honor. The receipts for the following twelve months were 66,147 and 741, respectively, bringing the totals, June 30, 1899, up to 161,212 and 5,549. Of the 66,147 recruit cards received, 12,511 were made out at the soldier's second or later enlistment and took their place at once with the previous card or cards of the men in the alphabetical file; 53,636 were for first enlistments and ordinarily would all have been compared with the transcripts before going into the alphabetical file, but, as was stated in my last report, the rush of work incident to the late war made it impracticable to compare them all.

From the time of the first identification (July, 1890) to June 30, 1899, 1,475 identifications have been made; 18 in 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, 108 in 1896,68 in 1897, 347 in 1898, and 273 during the first half of 1899.

SANITARY CONDITION OF MILITARY POSTS IN THE UNITED STATES.

The sanitary condition of the permanent military stations in the United States varied greatly during the year. Prior to the declaration of war with Spain, they were all in excellent condition or in the gradual progress to improved conditions, as a result of the judicious distribution of the funds appropriated year by year for this purpose. Early in the year several new posts were established and old and abandoned stations were regarrisoned chiefly with a view to coast defense. The sanitary reports from these posts are filled with recommendations of the most elementary character, as in the majority of these cases provision had to be made for quarters, water supply, and methods for the disposal of wastes, all of which required time for their satisfactory evolution. Meanwhile most of the large interior posts were depopulated and the organizations constituting their garrisons were aggregated in camps for active service. A few, such as Fort Thomas, Ky., Fort McPherson, Ga., and Fort Myer, Va., were utilized as general hospitals. Some were garrisoned by volunteer commands, while others remained practically abandoned for the time being. All suffered deterioration from neglect, ignorance, lack of discipline, or changes made to render them available for temporary purposes, so that when the regular troops reoccupied them after their return from Cuba they were by no means in the excellent sanitary condition in which they had been left only a few months before. Besides, at this time, the posts, which were made the rendezvous of certain of the commands prior to their departure for the Philippine Islands, were temporarily overcrowded, generally with raw and undisciplined recruits, a condition which gave medical officers much room for adverse criticism and recommendations for sanitary improvement.

As illustrative of the progress made in the establishment of new posts, or the reestablishment of old posts, the case of Fort Caswell, N. C., may be cited: A battery of artillery was sent to this place in March, 1898. As there was no building available for quarters or storehouses, the command was camped in common tents in which they were much crowded, as they had their garrison outfit with them. An increased allowance of tentage was asked for and granted. The water supply was surface water taken from the sand near the tide-water level. It was of doubtful quality and affected many of the engineer workmen with intestinal disturbances. Even this supply was scanty, and water was brought by steam tug from a point 20 miles up the river. Meanwhile arrangements were made to obtain water from driven wells. The cooking facilities were limited to the field outfit. In May, a quartermaster's storehouse had been built and an ample supply of good water was obtained from the wells. The sinks became offensive and a dry-earth system was substituted for them. A subsistence storehouse was erected in June. In November, the officers' quarters were completed and ready for occupancy, and the hospital, the mess hall, and barracks for the men were well advanced. All stagnant pools were filled up with sand and pipes were laid to carry waste water from the barracks and kitchens. Later an allotment of money was made by the Quartermaster's Department to perfect the drainage and grading.

In May, 1898, many undisciplined troops were aggregated at some of our posts, as at Fort McPherson, Ga. The sanitary conditions became changed immediately. The medical officer reported the sewers as being constantly choked by paper of all kinds, socks, handkerchiefs, and even drawers. Open sinks were dug in various places to relieve the pressure, but these were rarely used. The woods became full of deposits made on the surface of the ground and these were washed into the brook which supplied water to the bathing pool recently constructed by the post quartermaster. Notwithstanding all warnings, the men drank out of this stream and an epidemic of typhoid fever was easily inaugurated. Two months later a general hospital was established at this post.

On the return of the regular troops to Columbus Barracks, Ohio, in October, 1898, the quarters at this post were greatly crowded, as squad rooms built for companies of 65 men were occupied by companies over 100 strong. Large numbers of recruits were sent to this station as a recruiting depot, so that in March, 1899, it was reported that many of the men had to sleep on the floors for want of a sufficiency of bunks and mattresses. The bunks in use were so closely packed that the men had to crawl over the ends of their beds to lie down. The ventilation of the rooms was entirely inadequate for such a crowded condition, particularly as many of the recruits were very dirty in their persons and clothing. Bathing facilities were such that with all the tubs in the bath house in use day and night it was impossible for each man to get a bath once a week. Many of the water-closets were choked and their filth overran the floors and permeated the building with its odor. The insanitary conditions in the neighborhood of the post were responsible for much of the prevailing sickness. The streets in front of the barracks were reported as quagmires, which the householders adjoining used as dumping grounds for their filth. Privies and stables face the finest residences of the post. Vacant lots are everywhere covered with garbage, ashes, and house refuse. Smallpox, measles, and venereal diseases were widespread through the districts in which the recruits spent much of their time when not in barracks. As many as 13 per cent of the command were at one time on the sick list. The hospital accommodations had to be increased by tent wards. An epidemic of measles at this post was greatly increased in malignancy by these crowded and insanitary conditions. (See page 241.)

The quarters at Madison Barracks, N. Y., also were overcrowded from November until the departure of the Ninth United States

Infantry for Manila, P. I., early in March. Twelve large companies had to be quartered temporarily in the rooms constructed for eight small companies, as no suitable building could be rented in the neighborhood. The severity of the weather prevented the use of tents, and time was not available for the construction of new barrack buildings. Fortunately the command remained healthy during this period of overcrowding and insufficient mess, bath, and water-closet facilities, but for recurring malarial attacks among men who had suffered in Cuba and venereal cases among the recruits sent from the depots to fill up the command to its maximum strength.

In November, 1898, after the breaking up of Camp Wikoff, Long Island, Fort Columbus, N. Y., became so overcrowded that the air space per man in barracks was less than 350 feet, while the water-closet accommodation amounted to only eight seats for over 400 men. The post surgeon urged an expansion of the air space in quarters and a provision of five seats for every 100 men present. Plans and estimates for these improvements had already been forwarded by the post quartermaster. In February, 1899, the water-closet and bathroom accommodations had been extended, but the overcrowding was still such that each man had only about 400 cubic feet of space in barracks.

At Fort Crook, Nebr., overcrowding of quarters was reported in November, 1898. Twelve large companies, or 1,379 men, were quartered in rooms originally intended for eight small companies. This congestion lasted until February, 1899, when the command started for the Philippine Islands.

Similar conditions of overcrowding were reported from Fort Wayne, Mich., in December, 1898.

Recommendation was made, in December, 1898, by the post surgeon, Fort Hamilton, N. Y., that a new guardhouse be built at that post, and that the water-closet and bathing facilities be extended to accommodate the increased strength of the batteries. The commanding officer reported that estimates had already been submitted for these purposes and for remedying defective drainage of grounds near the new hospital.

The guardhouse at Fort Adams, R. I., has been repeatedly condemned by medical officers as infested by vermin and unfit for use. It is understood that the subject of a new building for this purpose is now under consideration.

The guardhouse at Washington Barracks, D. C., is an old brick building with many sanitary defects, and so small as to give in the prison room, at times, less than 150 cubic feet of air space to each of its occupants. The construction of a new guardhouse was recommended by the post surgeon.

Medical officers at several posts have called attention to the insanitary condition of the buildings used as quarters by the families of enlisted men. Special attention was recently directed to this subject by a communication dated February 19, 1899, from the post surgeon, Fort Leavenworth, Kans., in which he represented that in certain of these quarters at the post there were at that time twenty-five cases of measles, three of scarlet fever, and one of cerebrospinal meningitis. Four cases of the last named disease, three of which were fatal, had occurred in these quarters, which are small, badly ventilated, and greatly overcrowded. The ground around these dilapidated buildings is so honeycombed with abandoned latrines that it is difficult to find a site for a new one. In a recent effort in this direction six different holes were dug before a spot was found which had not previously been used for this purpose. The post surgeon urged the removal of these buildings, as in his opinion they constituted a menace to the health of the garrison. On March 8, 1899, Lieut. Col. E. A. Koerper, chief surgeon of the department, inspected the post in connection with the report and recommendation of the post surgeon. He reported that many of the buildings were nothing but shacks and shanties, and that all were overcrowded and in a deplorably insanitary condition. All were dependent on earth pits for the disposal of excreta, and the surrounding soil was honeycombed with disused pits. He furnished a list of the buildings, which, in his opinion, should be destroyed, and cited a report, dated October 12, 1897, by Maj. Francis Moore, Fifth United States Cavalry, acting inspector-general, to the same effect. This was forwarded by the department commander with request for authority to carry out the recommendation of the chief surgeon, remarking in his indorsement on the papers that although the destruction of the buildings would be a hardship on many old soldiers it was nevertheless recommended and urged as a sanitary measure. "These pest holes have been a menace to the health of this garrison for years, and it is time now that they should be destroyed and the danger removed."

In the September, 1898, report from Fort Sill, Okla., certain of the so-called laundresses' quarters were stated to be not only unsightly but in the worst possible sanitary condition. As it was deemed impossible to repair them, request was made for authority to destroy them by fire, to avoid the labor of tearing them down and carting away the valueless materials. The department commander granted the desired authority.

In my report for the year ending June 30, 1893, page 100, and again in that for 1897, page 141, I invited attention to the subject of quarters for married soldiers, instancing a number of cases such as those now referred to at Fort Leavenworth and Fort Sill, and recommending that public quarters be provided for a limited number of married men in each organization, all others being strictly prohibited from having their families at the post. A provision of this kind would be regarded as a privilege awarded to deserving soldiers, and would permit the whole of these unauthorized huts and shanties to be destroyed. I respectfully renew this recommendation.

Defective heating arrangements were reported from only one post, Fort Logan H. Roots, Ark. The hot-air system in use at this post was considered by the surgeon as responsible for an unusual prevalence of throat and lung affections. He recommended the substitution of a hot-water system such as was in operation in the hospital. The chief surgeon of the department concurred in this recommendation.

The need of a sewerage system for the post of Fort Sam Houston, Tex., was urged by the post surgeon in December, 1898, on account of the danger of the propagation of typhoid fever by carelessness in carrying out the details of the dry-earth system of disposal. Plans and estimates already forwarded met with the approval of the department commander, who considered that the method in use had become so objectionable that it might be stopped at any time by an injunction from the city of San Antonio. A sewerage system to connect with that of the city should be constructed at an early date.

A careful inspection of the post at Angel Island, Cal., was made in November, 1898, by Capt. Thomas U. Raymond, assistant surgeon, United States Army, who called attention to defects in the sewerage system, and particularly to the latrines, which are practically cesspools, flushed out daily in an imperfect way. As the buildings connected with this unsatisfactory system are also unsatisfactory, it was not deemed advisable by the department commander to recommend a new sewer system which might be unsuited or inconvenient to new structures soon to be needed if the post is to be continued. The main water supply of this post is derived from springs in the high grounds of the island, the water being collected in two reservoirs, one of which is considered as a reserve in case of fire. The supply varies from 8,500 gallons per day in the dry season to 15,000 gallons or more per day during the rainy season.

Protest has frequently been made in past years against the privy pits and cesspools used for the disposal of excreta and waste water at Fort Washakie, Wyo. In his report for November, 1898, the post surgeon again raised this question, and, in accordance with a recommendation of the chief quartermaster, the post commander was directed to prepare estimates of the material and labor needful to lay a pipe system for the removal of surface and waste water and for the introduction of a dry-earth system instead of pits for the disposal of excreta.

New quarters and a system of sewerage are desirable at Fort Meade, S. Dak., if the post is to be continued. Concerning this post the surgeon, in January, 1898, reported:

> There is among the men a great tendency to throat, lung, and rheumatic affections, and an apparent continuance of malarial fevers of various types. This tendency is to a marked degree confined to the barracks, and is not observed in officers' families, where sanitary conditions are better, and this notwithstanding the fact that there are numerous children on the row. The great sanitary evil is the lack of light and proper ventilation in the barracks. In a few of the large squad rooms holes have been cut near the ceiling, but these are inoperative as far as ventilation is concerned; so that practically these barracks gain no fresh air in winter time excepting through defective joiner work and infrequently opened doors and windows. The odor in these rooms is a very palpable mixture of man, horse, horse equipments, and cooking.
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> The inclosed sketches [not here submitted] of several of the troop buildings will explain graphically the light question. These show the numerous additions to the buildings. There are corners, pockets, dark blind passageways, wash rooms, gymnasia, barber shops, tailor shops, troop libraries, until a large part of light and ventilation from the back windows is shut off. In addition, along the front of each barracks there is a large porch, excluding a large part of the light from that side. It needs no amplification of this subject to also show how bad such patchwork construction really is, not only from the standpoint of light and ventilation, but cleanliness and sanitation of these blind spaces. The floors in nearly all the barracks are poor, in some of them exceedingly so. They are patched and splintered, and take up large quantities of water. The water sifts through the cracks and gaps and lies in the worn wood, keeping barracks damp, and, when heated, steaming and adding no little to the causes of respiratory and rheumatic troubles. These floors should never be scrubbed or deluged, as many of them are, with water. They should be mopped with damp mops and wiped, and excessive use of water on the woodwork avoided as far as possible. The kit of a cavalryman is large, his uniform and equipments are many, and his contact with the stables and horses make these clothes necessarily odorous and add to the difficulties of ventilation and deodorization. Many of the men keep portions of their horse equipments at the head of their bunks, and bridle and bits covered with the slobbered saliva of the horse can often be found. In a great many of the troops all of these impedimenta are housed under continuous curtains, which collect a great deal of the dust they are designed to avoid. Wherever fixed, they become very unclean, and they effectually block all natural tendencies to airing and removing the many odors incident to stable and barracks.

The post commander promptly issued orders for remedying, as far as possible, the insanitary conditions mentioned by the surgeon in his special report. Recently, June 8, 1899, an inspection made by the chief quartermaster of the department brought prominently to notice the dilapidated and insanitary character of the barracks and the need for a sewerage system.

In November, 1898, the sewers at Benicia Barracks, Cal., became choked, and on investigation it was found that sections of the ironstone sewer pipe had been displaced and obstructed by the roots of eucalyptus trees growing near by. The substitution of iron pipe was recommended.

In February, 1899, the water supply of Fort Adams was reported by the post surgeon as full of decaying vegetable and animal substances. This water, which is derived from the city supply of Newport, R. I., was introduced in 1890, on account of the bad character of the well water at Fort Adams. In 1897 the representation of the then post surgeon, concerning the amount of organic impurity in the water, led to the recommendation that a condensing plant be provided, but this recommendation appears to have been overlooked or disapproved. The vegetable impurity in the pond water of Newport has been recognized every time the water has been analyzed, but as we have no record of the prevalence of water-born diseases at Newport, and as the average annual sick rates at Fort Adams since 1890 have been less than the average rates of the Army, no action was considered needful on the recent recommendation of the post surgeon.

THE FIRST ARMY CORPS.

The First Army Corps was aggregated at Camp George H. Thomas, Chickamauga Park, Ga., early in May, 1898. It consisted of three full divisions of nine regiments each, commanded by Maj. Gen. John R. Brooke, who was also in command of the other troops, belonging to the Third and Sixth Corps, encamped in the park. Lieut. Col. Albert Hartsuff, deputy surgeon-general, United States Army, was chief surgeon of the camp, and Lieut. Col. Rush Huidekoper, United States Volunteers, chief surgeon of the Corps. The report of the services of the latter officer is given in my last annual report, pages 163–172.

The camp included an irregular area, 10 by 12 miles, or about 70,000 acres, bounded on the west by Chickamauga Creek. The surface was partly wooded, partly cleared, rolling and level, with sufficient grade to carry surface water into natural channels, which were dry except after rainfalls. The whole region was underlaid by magnesian limestone which, in some places, cropped out on the surface but was generally covered with a stratum of clay. Most of the regimental camps were established on this impermeable clay.

The troops of the First Corps that were aggregated in this camp were similar in physique and general characteristics to those of the other corps encamped in the park, and to those of the Volunteer Army encamped in other locations, as at Camp Alger, Va., Mobile, Ala., Tampa, Fla., and other Southern camps, because they were all enlisted under the same law and generally under the same conditions. Medical scrutiny varied, of course, with the experience and intelligence of the medical men engaged in the duty of recommending the acceptance or rejection of the candidates for muster into the United States Volunteer Army.

I referred in my last annual report, page 109, to the subject of age. In calling out 125,000 volunteers from a nation like the United States it was a mistake to reduce the minimum age for enlistment from 21 to 18 years. The population and patriotism of the country were such that the required number of troops could readily have been obtained without reducing the age for enlistment. In time of war, nations when hard pressed may have to call out both their very young men and their old men. To rob the cradle and the grave is a phrase which has been embalmed in the history of this country, but in April, 1898, there was no occasion to do either. The Regular Army at that time consisted of well-developed men. In its ranks were only 40 boys under 21 years of age, and these had been enlisted as musicians; but when the age limit for enlistment in the Volunteer Army was reduced to 18 years, patriotism, enthusiasm and desire for excitement led the schoolboys to the recruiting offices, and the ranks of the Army became crowded with undeveloped youths ready to break down under the slightest exposures of war service, and, as it was afterwards demonstrated, under the exposures incident to service in the home camps of organization. All military experience shows that young men under 21 years of age break down readily under the strain of war service, and the regiments of our Volunteer Army had many of these boys in its ranks. To give a single citation from our own experience in this respect, I quote from a report by Lieut. Col. A. A. Woodhull, deputy surgeon-general, United States Army, in relation to one of the regiments encamped in Chickamauga Park:

> Again, in the case of the Fifth Missouri, I was informed by the Colonel that especial pains had been taken to exclude lads, and that the average age of his men was 28 years. In this command, whose surroundings were extraordinarily bad, where 1,300 men had been confined since May 27, on an area 320 by 230 yards, shut in by other regiments, with sinks immediately about them, and constantly encroaching nearer and nearer, with necessarily narrowed and crowded streets, although typhoid fever has appeared, the actual sick list is relatively low, being 3.2 per cent. This I attribute to the greater resisting power of these full-grown men. An immature regiment would have been badly shattered under these conditions.

Another reason why so many men unfit for active service were accepted into the Volunteer Army is to be found in that same principle which permitted the enlistment of immature youths—the mistaken principle that in time of war anyone is good enough to be food for powder. To accept the man best fitted for the service to be required of him is one thing. To accept a man who may fire a musket or stop a bullet if he be assumed to be in his place in the line is another. In a warfare which requires only the manhood of a nation to conquer, the best men should be selected. In the despairing effort of a nation in the last ditch, every man who is able under pressure to do a man's duty should be forthcoming. The examination of volunteers who desire to go to the front is one thing. The examination of conscripts or drafted men who desire to stay at home is another. The instructions in Greenleaf's Epitome of Tupler's Manual fail to make clear this distinction, which, however, should be obvious; and medical examiners accepted men as volunteers in perfect condition for military service, who should have been accepted only if the draft had brought into question their ability to fill the ranks of a hard-pressed army.

Again, many men distinctly unfit for active service, or of doubtful physical qualifications, were accepted by recruiting officers and medical examiners, because they had a record of several years' service in the National Guard, irrespective of the consideration that service in the State military forces in time of peace is a wholly different matter from service in the Army of the United States against an active enemy, with all the possible incidentals of fatigue, hard fare, and exposures of every kind.

The proportion of men of undeveloped or faulty physique, or even with absolute disabilities, was so great as speedily to attract the attention of chief surgeons, who made earnest efforts to weed out these undesirable men, that their sick lists might not be unnecessarily burdened, and that the number of undeserving claims for pensions to be presented for consideration in the future might be lessened. So extensive, however, was this evil that ultimately general measures had to be adopted for its remedy by the issuance of General Orders, No. 100, Headquarters of the Army, July 16, 1898, which provided for a board of medical officers in each division for the examination and elimination of such men from the regiments.

In the First Army Corps, at Chickamauga, as among the other corps there and elsewhere, the immature constitutions of the younger soldiers, and the faults in physique of those older men who ought not to have been accepted in the first instance, formed the basis of a sick list which necessarily increased in proportion to the hardships, privations, and exposures of camp life, to the recklessness and the ignorance of youth, to the vicious proclivities of many, and to the want of that company and regimental discipline which in the Army represents the household virtues, the domestic economy of the family, and the police system of civil communities.

The privations and exposures of these raw troops in Chickamauga Park were primarily due to the rapidity of the concentration. The country was simply unable to provide them at such short notice with all that was needful for their comfort and proper equipment. There was also ignorance on the part of officers of the method of getting at and utilizing those articles which the Government had succeeded in providing. This applies as well to medical supplies as to clothing, military equipments, and even to the food necessary from day to day for the subsistence of the troops. In addition there was an ignorance of camp sanitation which accepted all the discomforts, privations, and insanitary conditions as necessarily associated with the duties of military life in the field. From the sentimental point of view this was highly creditable to the patriotism and enthusiasm of both officers and men, but from the point of view of the military sanitarian it was an element of the greatest danger. All the regimental camps were crowded on insufficient areas. All the tents, on account of a deficiency of tent canvas, were overcrowded. Half of the men slept at night on the ground on their blankets, without flooring for their tents and without bedsacks or cots. The same ground was occupied month after month, the soil becoming more and more contaminated. It was difficult to keep the sinks and cesspools in good condition on account of the impervious character of the clay subsoil in which they were excavated, and it was equally difficult for these untrained levies to dispose of their constantly augmenting masses of garbage and other refuse. In fact, during the months of the occupation of Camp George H. Thomas the raw levies encamped there were exposed to all the privations and exposures of troops in actual conflict with an enemy, saving and excepting only the danger from gunshot injuries. And this remark is applicable as well to the regiments in every one of our camps of organization during the months of May, June, and July, 1898.

The water supply of Camp George H. Thomas was at first from Chickamauga Creek and numerous springs and wells in the park. An extensive pipe line, with many taps, afterwards supplied creek water, and many tubular wells were sunk. It is the opinion of medical officers who have examined the waters and considered the sanitary conditions that the former were not concerned in the propagation of typhoid fever in this large camp.

Some of the reports rendered to this office attribute much of the sickness among the young men to the reckless use of fruits, confectionery, etc., purchased from peddlers in camp. Others call attention to the harmful effects resulting from the overheating of the men and subsequent chill from overwork at drill, for here, as elsewhere, the main object of company and regimental officers appeared to be military drill, without due regard to the comfort, cleanliness, food, or general well-being of their men. Others again refer to the injury effected by the saloons of Chattanooga, and, lastly, there are some which claim that venereal disease did more to undermine the strength of the troops in Chickamauga Park than the epidemic of typhoid fever, which was recognized officially during July as the disease to be specially dreaded.

The object of the concentration of troops in Camp George H. Thomas was to prepare these raw levies for active service against a powerful enemy in the field, by organizing the regiments into brigades, divisions, and corps, the regiment as a unit of activity being regarded as inadequate to meet the warlike possibilities which had already called over a quarter of a million of men into the ranks of our army. It became incumbent on the medical department to organize its personnel in correspondence with the organization effected in the line. When brigades, divisions, and corps are operating as units in the field of warfare, medical and surgical assistance organized on a regimental basis is not competent to meet the probabilities. This was demonstrated during the progress of our civil war. The magnificent record left by our division field hospitals, from Antietam in September, 1862, to the surrender at Appomattox in April, 1865, has been studied, appreciated, and recognized by the military medical men of every civilized nation.

Every medical officer who was in the field during our civil war will testify to the inefficiency of a regimental hospital organization when corps are moving against corps, and to the splendid achievements of the same medical force when organized by divisions. To utilize the experience of the civil war, which is yet fresh in the memory of our older medical officers, I issued Circular No. 3 (p. 140 of my last annual report), which practically directed the disestablishment of regimental hospitals in regiments which had been aggregated with others to form higher units of military force, and the temporary consolidation of their personnel and equipment into a medical service for the division as a unit, the consolidations to be so effected that each brigade should have its sectional representation in the division medical establishment.

The chief surgeon of the First Army Corps, although without previous experience of this organization by divisions, proceeded in the most intelligent and energetic manner to carry out the requirements of the circular, with a view to an efficient medical service for his corps. The difficulties which he encountered were similar to those met with by other corps surgeons excepting those of the Fifth and Eighth corps. The Fifth Corps effected its divisional organization with facility, because its line and medical officers were regulars accustomed to obey orders and instructions to the letter. The Eighth Corps established its hospitals without difficulty, because it was in the face of an enemy and the wisdom of the proceeding was manifest from the character of the services required of the medical force. But in the other corps—in camps of organization in the United States—regimental surgeons of volunteers raised the strongest opposition to the consolidation.

Regimental commanders accustomed to a regimental medical organization in the State service sided with their medical officers in their protestations against the withdrawal of their personnel and equipment for the formation of an institution outside of the regimental lines, and State governors were invoked to prevent this interference with the regimental status. The division hospitals were, however, ultimately established, but in many cases not until the insanitary conditions of the camps had rendered them valueless as a provision for war service by converting them into stationary hospitals for the treatment of the daily increasing number of sick men sent to them from the regiments. To meet the needs of the occasion these hospitals were extended and fitted up with cots and ward furniture which could not have been transported had the division been ordered to move. Their status being thus changed and the medical services required of them being greater than could be rendered by the detailed regimental officers, staff and contract surgeons were assigned to duty in these wards, with trained nurses to take the place of newly enlisted and untrained members of the hospital corps (see p. 24).

Three division hospitals and a reserve hospital, with an ambulance company attached to each, were organized in the First Army Corps in June, before the regiments began to have sick lists greater than 2 or 3 per cent. The First Division hospital had 120 beds, the Second 150 beds, and the Third 206. Toward the end of July the number of grave cases of sickness increased, the hospitals became crowded, and many serious cases of sickness were retained in regimental hospitals. The following, from a report by Maj. R. Stansbury Sutton, chief surgeon, United States Volunteers, shows the condition of these division hospitals at their worst:

> On August 1 I was detached by higher authority from my brigade and put in command of the Second Division hospital of 263 beds. At the hospital I found 162 patients, 6 medical officers, one lieutenant, a commissary of subsistence, and 39 out of 96 men who should have composed the hospital corps. Out of these 39 I had to find nurses, kitchen men, clerks, laborers, and guards. Of the number on hand some were physically ill suited or actually ill. Six noble doctors were on duty—three majors, Charlton, Baguely, and Myers; Captain Dutton, and Lieutenants Little and Nesbit—taking all the three watches of eight hours each, and 162 patients. I was cut down to depend on 12 or 14 nurses for day and night duty. These were soldiers with only accidental experience, and but little of that in civil life. Seventeen sick soldiers lay on the ground. There was poor preparation of food, and but a limited supply of proper food for the very sick. Major Charlton, whom I relieved, was ill. I soon, but after much perplexity, got over the difficulties, and the hospital flourished.

When the First Division moved en route for Porto Rico, about July 23, its hospital was left behind with 153 cases under treatment. When the Third Division broke camp and was moved to Lexington, Ky., its hospital, then containing 500 beds, was left behind and continued as the Sanger General Hospital. The overflow from the division hospitals, with that from the hospitals of the Third Army Corps, was received into the Leiter General Hospital, and into the large Sternberg Hospital, which was ready for occupancy in August.

The ambulance companies attached to these field division hospitals were at best only skeleton organizations. Much of their material was gathered together by the energy of the chief surgeon. Their officers were assigned and did their best to drill and train the few Hospital Corps men who were available. Ultimately the increase in the number of sick required the use of every man for ward and other hospital work, and the ambulance companies became practically nonexistent.

Fortunately the movement of the First Division to Porto Rico, by way of Newport News, Va., took place prior to this strain on the medical department of the corps and while the reserve division hospital and its ambulance company was in a state of fairly good preparation for field service. It consisted of 12 commissioned officers, 213 enlisted men, 24 ambulances, 20 army wagons, and tentage equipment and supplies for 250 beds. This was reenforced at Newport News by a brigade section of the hospital of the First Division, consisting of 3 medical officers, 60 enlisted men, 8 ambulances, and 5 wagons, with the material for a field hospital of 50 beds. These hospitals advanced from Ponce with the troops and did efficient service at Guayama. The campaign was short, but it is safe to say that had it lasted longer the field hospital would have done excellent service. The reserve hospital, with its ambulance corps at Guayama, was broken up October 27, 1898. Most of its material and part of its personnel were installed in the general hospital at San Juan. The section of the First Division hospital at Coamo was closed in December and its personnel and equipment were distributed to various posts in the recently formed Department of Porto Rico.

In September such of the regiments of the Second Division of this corps as had not been sent home for muster out were moved into winter quarters at Knoxville, Tenn., while the Third Division was encamped at Lexington, Ky.

THE SECOND ARMY CORPS.

The Second Army Corps was aggregated in a camp of organization in May and June, 1898, at Camp Alger, Va., about 7 miles from Washington, D. C. No efficient supervision was exercised in the establishment of the various regimental and brigade camps. Space which ought to have been utilized to give the necessary area to the camps was reserved for purposes of drill and parade. The three battalions of a regiment were compressed on an area not large enough for a battalion, and some of the brigades were on ground insufficient for a regimental camp. The tents were crowded against each other and were so overcrowded within that 5 or 6 men were frequently to be found in tents the occupancy of which should have been limited to 3 men. No provision for cots or bed sacks had been made. The men lay on the ground on their blankets, which became matted with mud or dust. It was impossible for them to keep clean under such conditions, particularly as these were aggravated at first by a scarcity of water. The kitchens were close up against the company tents, with uncovered cesspools at a distance of a few feet from them for the convenience of the cooks in disposing of kitchen slops and garbage. The sinks were too small for the accommodation of the men, so that they were constantly in use, constantly reeking with fresh and uncovered excreta, and so near to the kitchens and company streets that the fecal odor was everywhere perceptible. Some faded brushwood piled up around the privy pits, or a strip of ragged canvas nailed to wooden uprights, gave no protection from sun or rain and but little from the gaze of the constant stream of visitors to the camp. A main road ran through the camp of the First Division, and the constant traffic on this road raised clouds of dust which made the air of the neighboring camps almost irrespirable in sultry weather. This road was lined with rude tents occupied by the retailers of lunches, confectionery, fruit, and soft drinks, whose goods, although uninviting from dust and flies, were freely purchased and disposed of by volunteer soldiers and their friends.

At first the water supply of this camp was wholly inadequate, consisting of a few wells and springs of doubtful purity and some slow-running shallow water in the ravines. The last was certainly impure, as it was fed chiefly by the rainfall from the contaminated surface of the camps and their vicinity. Efforts were made by medical officers and in many instances by line officers to interdict the use of this surface water and to have the water from the wells and springs boiled before use as a drinking supply, but it was exceedingly difficult to accomplish this. At my request the Quartermaster-General provided for this corps a number of Berkefeld and Maignen filters, which appeared at the time to be the best system of filtration by which a sterilized water could be procured for troops in the field. The passage of the water through the larger pores of the asbestus or Maignen filter removed the grosser particles, which gave a turbidity or cloudiness to the water and which but for their removal in this way would have choked the finer pores of the sterilizing Berkefeld cylinders. These filters were, however, not used by the troops in this camp, but were left in the hands of the Quartermaster's Department when the corps moved to Camp Meade, Pa. Meanwhile the Engineer Department solved the question of water supply for this command by sinking about 30 tubular wells, each over 100 feet deep, and all yielding a free supply of organically pure water, which was on tap in each of the regimental camps.

Under these unhygienic conditions the troops remained for two months. The officers devoted themselves to drilling their men in preparation for active service in Cuba and paid little attention to the domestic economy of their companies, while the men themselves accepted all these discomforts, hardships, and exposures as necessarily connected with their service as soldiers. In May and June the sick lists were relatively small, consisting mainly of measles, vaccination, venereal cases, and camp diarrhea, due to errors of diet, faulty cookery, ignorance of the methods of obtaining variety of subsistence stores, polluted surface waters, and chills from the heavy perspirations following late afternoon drills. Four cases of typhoid fever were reported in May, the infection probably brought from State camps. Typhoid fever is so disseminated in our cities and throughout the country that it is impossible to gather together 20,000 young men without having some cases of this disease in its incubatory stage among them. In June 23 cases were reported, and many of the cases on sick report in regimental hospitals during that month as cases of remittent fever were afterwards found to be cases of well-defined typhoid fever. These may readily be attributed to imported infection and to the propagation of the disease by the polluted water of the early period of the occupation of the camp. In July, however, it became manifest from the increasing number of cases that the camp and camp site had become infected; that the cause of the disease was present in the overcrowded tents, in the unwashed blankets, in the soil of the sinks and cesspools carried by swarms of flies to the food on the near-by tables and inhaled by the men in the dust-laden atmosphere. The abandonment of the camp offered the only hope of eradicating the disease from the command before all those susceptible to the typhoid influence had become affected. By leaving the declared cases under treatment at the general hospital at Fort Myer, Va., and moving the command to a new location it might be expected that the disease would be brought under control, particularly if the settlement in the new camp was not effected for ten days or two weeks, to permit of the removal of those cases which left the old camp in the undeclared or incubatory stage. Accordingly, about the middle of July the Second Division, taking only shelter tents with them, moved from Camp Alger en route to Camp Meade, Pa., by way of Thoroughfare Gap. On arriving at Manassas, Va., a number of incipient cases of typhoid fever became declared. These were left in a field hospital at Bristow, Va., and to this hospital cases that were developed while the command was at Thoroughfare Gap were sent back. By the time the division reached Camp Meade the infection appeared to have been shaken off. On the abandonment of Camp Alger the First Division established itself at Dunn Loring, Va., sending its typhoid cases, as they became defined, to the general hospital at Fort Myer, and on August 14, 1898, this command, also now in good condition, was moved by rail to Camp Meade, Pa.

This camp was laid out with special care to avoid the overcrowding and unsanitary conditions which had proved so disastrous at Camp Alger. The water supply from the first was of a satisfactory character, and it was expected that there would be no further outbreak of disease among the troops of this command. Many changes, however, had been taking place in the constitution of the corps. Some regiments had been ordered to their States to be mustered out, and twelve new regiments, from different parts of the country, took their places. Many of these had suffered from fever in their State camps and brought cases with them to Camp Meade, so that the utmost care had to be exercised in preventing a general infection of the new site. One of these infected regiments was the Fifteenth Minnesota Volunteers, from Camp Snelling, Minn. This regiment was organized and mustered in during the period July 10 to July 18, 1898, at Camp Ramsey, on the grounds of the State Agricultural Society, situated within the city limits of St. Paul, Minn. Concerning this camp Maj. R. J. Fitzgerald, surgeon Thirteenth Minnesota Volunteers, reported on May 16, 1898:

> The troops consisted of the Twelfth, Thirteenth, and Fourteenth Minnesota Infantry. * * * Such cases as were considered too sick to remain in camp were transported to St. Paul City Hospital. * * * I would add that the greater number of the more severe cases were those of typhoid fever contracted before reaching the camp and developed after their arrival.

In view of the presence of typhoid fever in this camp as early as May, it is not surprising that the Fifteenth Regiment became affected shortly after its organization at this point. The records show that during July there were 131 cases on the sick report of this regiment, chiefly bowel affections. In August the admissions to sick report numbered 602, and about 260 of these proved to be cases of typhoid fever. They were distributed among nine different hospitals in the cities of St. Paul and Minneapolis. The regiment marched from Camp Ramsey to Camp Snelling August 23, 1898. Lieut. Col. H. R. Tilton, chief surgeon, Department of Dakota, inspected this camp September 2, and reported, under date September 6, 1898:

> I examined the hospital, where, in three hospital tents, I saw 18 men who were under observation. These men were on comfortable cots. When a sufficient time has elapsed and the cases prove to be typhoid fever they are sent to other hospitals where there are facilities for the proper care of serious cases. * * * I visited also the post hospital, where I found 24 typhoid-fever cases in the two wards, with an officer in a separate room, also with typhoid fever, and 16 cases in four hospital tents. These were all from the Fifteenth Volunteers. * * * Since my inspection additional cases of typhoid fever have been sent to the post hospital. On the 5th instant I was informed that the number of cases amounted to 60.

This brief review of the medical history of the Fifteenth Minnesota Volunteers will show the danger to which the new camp of the Second Army Corps was exposed by the incoming of certain regiments from their State camps. This regiment, immediately on its arrival at Camp Meade, transferred to the field division hospital 40 cases of sickness, most of which proved to be typhoid fever. The chief surgeon of the corps reported at this time that the Thirty-fifth Michigan came from an infected camp and that the Two hundred and third New York had several hundred cases before arriving at Camp Meade. The cases which resulted from this fresh invasion of infection were mainly transferred for treatment to the hospitals of Philadelphia and other cities of Pennsylvania.

In view of the severity of the winter months at Camp Meade, arrangements were made for the transfer of the troops to camps in a milder climate. Sites were selected by boards of officers, and, so far as concerns the medical department, pavilion hospitals were constructed at Augusta and Athens, Ga., and at Columbia, Greenville, and Summerville, S. C., to receive the overflow of sick from regimental hospitals, which had now been reestablished. These camps had been laid out with the utmost care, and they were as much superior to those at Meade as the latter were to those at Alger. Few cases of typhoid fever occurred after the establishment of the troops in these quarters. Later the regiments were ordered home for muster out. A few words will show the character of the division hospitals of this corps during its stay in winter quarters.

The hospital of the First Division, Second Army Corps, established at Camp Mackenzie, Augusta, Ga., November 19, 1898, consisted of frame buildings, an administration building of four rooms, and six pavilions, each containing two wards, with a wash room and linen closet to each ward. The construction of these buildings was not satisfactory. The walls of one pavilion separated on a calm, still day, and the roof came down, but so slowly that the inmates were enabled to escape without injury. Another pavilion, after a wind storm, leaned dangerously to one side, and all required strengthening at various times in the way of binding the walls securely together. The shrinking of the lumber gave rise to cracks which interfered with heating during cold weather, so that it was considered necessary to line the walls with blankets to a height of four feet. Water-closets were slightly detached from the wards and were connected with the Summerville sewers. A formaldehyde disinfecting chamber, with a capacity of 400 pieces, was built soon after the hospital was occupied. Electric lights were used and proved very satisfactory. Trial was made of acetylene gas in one of the wards. The light was considered superior to the electric light, especially for operative work at night, but it was used only for a short time, as there was danger of an explosion with the apparatus tested. Maj. William B. Banister, the surgeon in charge, reported that with a safe apparatus the light would be of great value in field hospitals, as it could be readily transported.

The medical officers on duty at this hospital were mainly acting assistant surgeons. The hospital corps company consisted of 7 acting hospital stewards and 64 privates. No systematic theoretical instruction was given to these men, as they could not be spared from their various duties for this purpose. They were associated with trained female nurses in the wards, and in this way received practical instruction in nursing and ward work. The largest number of trained female nurses on duty at any one time was ten. A small dormitory was built for them, one end of which was partitioned off as a sitting-room; small lock boxes were provided for the safe-keeping of valuables. The division consisted of the First Maryland, Thirteenth Pennsylvania, Fifteenth Minnesota, Tenth Ohio, and Thirty-fifth Michigan Infantry, with volunteer signal-corps companies and engineers. Its strength varied as the regiments were mustered out of service. In December, 1898, and January and February, 1899, the average strength was about 8,000 men. The hospital was closed May 31, 1899. There were treated in it 963 cases, of which 273 were venereal and 137 malarial diseases, 113 measles, 53 influenza, 51 bronchitis, 28 pneumonia, and 28 typhoid fever. Ten deaths were reported; enlisted men 8, civilians 2. Caused by typhoid fever in 6 cases, pneumonia in 2, consumption in 1, and pulmonary œdema following delirium tremens in 1 case.

The systematic and orderly method of conducting the business of this hospital may be understood from the following file of the general orders published for the guidance of its personnel:

General Orders, No. 1, December 2, 1898:

1. The following orders are published for the information and guidance of all concerned, and must be rigidly obeyed in every particular.

2. The ward surgeon will be required to be on duty from 8 a. m. to 6 p. m., with one hour at noon for meals. While not on duty in the wards he is to be found at all times about the hospital building, unless on leave or properly excused.

3. He shall render the female nurses in charge of diets, each day, a list of diets required in wards. These diets will only be issued over his signature. Liquor of any form will also be prescribed by him on a regular prescription each time it is to be used.

4. He shall report each morning the number of patients in his ward to the executive officer, giving number of new admissions, discharges, or deaths, or any other information about the wards or patients which is of importance.

5. He shall insist upon perfect discipline in his ward, and require all patients who are able, and orderlies or other enlisted men in the wards, to stand to "attention" when he or any other commissioned officer enters the ward, and remain standing until excused or the officer or officers leave the ward.

6. He shall see to the proper instruction of the nurses and men on duty in the ward, and maintain cleanliness, order, and discipline.

General Orders, No. 2, December 2, 1898:

The following orders are published for the information of the officer in charge of the receiving ward and his assistants.

1. The surgeon in charge of the receiving ward shall be on duty from 8 a. m. to 6 p. m. each day, and the officer for the night from 6 p. m. to 8 a. m., excepting an hour for meals and such other duties which may call him away from his ward.

2. His duties are to receive patients on the proper transfer slip, noting the latter in the receiving book, and if no diagnosis is given, or if the one given be incorrect, to establish one and enter the same upon the slip and in the book. He is to see that the transfer slip contains all the data called for, and any information not contained in the same to be entered at once.

3. He shall see that the patient is properly cleansed, his clothes properly tagged and cared for by the orderly on duty in the receiving ward, a tag put at the head of the bed, with history and name of the patient in full, giving rank, company, regiment, date of entrance, and diagnosis on admittance.

4. He shall issue a blank receipt to the regimental adjutant and surgeon to whom he returns patients, who will in turn sign the same and return it to the surgeon in charge of the receiving ward.

5. The receiving-ward book is to be submitted before the surgeon in charge of the hospital at 9 a. m. each day for his examination, and it must always contain a slip giving total number of patients in hospital, total returned to duty, and died since last or previous report.

6. The surgeon in charge of the receiving ward will be held responsible for the condition of the ward and operating instruments, cleanliness of the room, correctness of the receiving book, discipline of the men under him, and general efficiency in his department.

General Orders, No. 3, December 3, 1898:

All acting assistant surgeons on duty at this hospital are hereby informed that orders originating from the surgeon in charge or his executive officer must be obeyed, whether they be given verbally or by circular.

General Orders, No. 4, December 3, 1898:

The following information is published for the information of the steward in charge of the dispensary and his assistant, and must be obeyed in every particular.

1. The dispensing steward will be required to be in the dispensary between the hours of 8 a. m. and 11 a. m., and 2 p. m. and 5 p. m., and 7 p. m. to 9 p. m. each day. At all other times his assistant must be present to relieve him, the dispensary never being without a dispenser.

2. His assistant is subject to his orders, and will obey them in every instance.

3. The dispensing steward will be held responsible for every article in the dispensary, and everything leaving the same must appear in the prescription, liquor, or property book. No one is permitted to issue any article or fill any prescriptions unless in the absence of the steward from the camp.

4. All prescriptions for liquor are to be pasted in the liquor book, those for medicines and articles for use in the ward in the prescription book. Any other articles must be accounted for on the property book.

5. It will be his duty to keep his department absolutely clean and tidy. No loafing will be permitted in the dispensary, except that the surgeons may congregate there while off duty.

Lights will be extinguished at 9 p. m. and the dispensary will be locked.

General Orders, No. 5, December 3, 1898:

The ward master and his orderlies on duty in the wards of this hospital are hereby informed that the following orders will be strictly complied with in their departments until further orders.

1. The duties of the ward master shall be to attend to his own personal cleanliness and dress while on duty in the ward, his decorum in the ward and the men under him, discipline among the patients and men, and the supervising and policing of the wards, closets, porches, beds, basins, urinals, bedpans, and any other articles in the ward.

2. Whenever a commissioned officer enters the ward it shall be the duty of the ward master or orderly first observing the same to call, "Attention," at which command every soldier is required to stand at attention until the officer's departure or until he is excused by said officer. Patients unable to stand need not arise when officer enters the ward.

3. Articles to be disinfected shall first be washed with soap and water, after which they must be washed with a solution of bichloride of mercury of the strength of 1-1500, and then with a solution of carbolic acid of the strength of 1-70. Traps will not be disinfected with bichloride, but a solution of creosol may be poured into them. All disinfectants and instruments or other articles to be kept in closets in order, including the brooms, brushes, clothes, and materials. Perfect ventilation must at all times be insured and the air kept wholesome and pure.

4. The ward master must remain on duty from 7 a. m. until 7 p. m., with the exception of meal hours and one hour in the afternoon for recreation, at which times he must put some other nurse or orderly in charge, and turn over any orders he may have received.

5. Each morning and evening when the relief of orderlies occurs the ward master must bring his ward report to the office, with the following information entered: Number of patients actually in ward, number of patients discharged, number of patients admitted, changes to be reported by names, rank, and company; any unusual occurrence in the ward.

6. Ward orderlies must report to the ward master at 7 a. m. and 7 p. m. (day and night), and will not be permitted to leave the wards unless relieved by the ward master, who will never allow all the orderlies to be absent at one time. Orderlies when so relieved, morning and night, must report to the steward of the hospital corps company before retiring to rest.

7. All orders of the ward master are to be obeyed by the ward orderlies, and the nurses of the ward are governed by the instructions of the ward surgeon. Orderlies will pay all respect to the nurses and assist them in every way possible.

8. Any changes or other assistance required in the ward will be made after notification of the executive officer or steward in the hospital. Lights will be extinguished not later than 9 p. m.

General Orders, No. 6, December 4, 1898:

Hereafter the commanding officer in charge of the hospital corps company, First Division, will cause a detail to be made each day of sufficient men to police the grounds about the diet kitchen and company street. Complaint having been made to this office from headquarters, First Division, this order is published for the information of the commanding officer of the Hospital Corps Company, to avoid future reports or complaints of this character.

General Orders, No. 7, December 9, 1898:

Hereafter all persons on duty at the hospital are cautioned against making any noise, or slamming any doors after the hours of 9 p. m. All loud talking or heavy walking in any of the wards or the rooms of the administration building is strictly forbidden after that hour throughout the entire building, and any infraction of these rules will be reported at once.

General Orders, No. 8, December 9, 1898:

In future all passes issued to men of the First Division Hospital Corps Company, to be legal, must bear the office stamp of the First Division Hospital, as below, in red ink.

General Orders, No. 9, December 10, 1898:

1. Acting Hospital Steward John Baggett, First Division Hospital Corps Company, will report for duty in the receiving ward of First Division Hospital.

2. Acting Hospital Steward John Wiedmeier, First Division Hospital Corps Company, will report for duty as overseer for the morgue at the First Division Hospital.

General Orders, No. 10. (Omitted.)

General Orders, No. 11, December 11, 1898:

The ward master in future will detail two orderlies each day or night to supply the necessary wood for the fires, and will be held responsible for any deficiency of wood in his ward at any time.

General Orders, No. 12, December 15, 1898:

In future all requisitions for diets or articles in the wards, or other departments of the hospital, must be handed to the steward in the executive office before 9 a. m. and 2 p. m. each day for signature of the executive officer.

General Orders, No. 13, December 20, 1898:

The following information is published for the information of those employed at First Division Hospital:

In case of any fire, collapse, or other accident to any part of the building, it shall be the duty of any present to telephone at once to the signal office or camp, in order that the electric current may be broken supplying the building with electricity. This must be done to prevent further danger from live wires in case of an accident.

General Orders, No. 14, December 23, 1898:

Private Walter Tetamore, hospital corps, is hereby assigned to duty in ward No. 3 as day orderly, vice Private Walter, relieved, who will report for duty in the receiving ward.

General Orders, No. 15, December 23, 1898:

1. Full diets will be served as follows: Breakfast from 7 a. m. to 8 a. m., dinner from 12 m. to 1 p. m., and supper from 5.30 p. m. to 6 p. m.

2. No meals can be given after these hours.

3. Meals will be served only to convalescents according to the reports of the stewards in charge of each pavilion.

4. Loafing, smoking, or the use of bad language is strictly forbidden.

5. All orders of the female nurses in charge of the diet kitchen must be obeyed.

6. Milk or any supplies needed in the wards will be given out on proper requisition only.

7. The cook's police will be held responsible for the cleanliness of the tables, floors, range, and windows of the diet kitchen.

8. All complaints will be promptly reported to the caterer, A. F. Miller, acting hospital steward, in charge of diet kitchen.

General Orders, No. 16, December 24, 1898:

First Lieut. R. W. Montelius, assistant surgeon, Eighth Pennsylvania Volunteers, is hereby relieved from duty as summary court officer at this hospital and Lieut. J. C. De Costa, assistant surgeon, Eighth Pennsysvania, is appointed to serve in his stead.

General Orders, No. 17, December 24, 1898:

Hereafter all men employed or on duty at the First Division hospital will be required to preserve, at all times, a soldierly bearing as to dress and necessary salutes.

No one will come into the office and report to the surgeon in charge without saluting, or without blouses buttoned. When any officer enters the wards or any part of the building the enlisted men on duty therein will stand at "Attention," or if in the hallways will give the prescribed salute.

Those going on passes will see that their dress is clean, and will keep their blouses buttoned while on the streets in the city. When speaking to an officer, enlisted men on duty at this hospital will stand at "Attention." Men at work in the office will not be required to stand at "Attention" unless spoken to by an officer.

When an officer of high rank enters a room of this hospital the men on duty there will stand at "Attention" until he leaves or excuses them, the first person observing said officer giving the command "Attention." Familiarity between the enlisted men on duty here and the officers will not be tolerated.

No unauthorized badges or insignia will in future be worn by any of the men on duty at the First Division hospital. Acting hospital stewards will wear the simple cross on their caps, and not the cross and wreath, as has been done in the past. Hospital stewards will wear the prescribed insignia on their headgear and the prescribed chevrons. Privates will wear the brassard on left arm, as prescribed in Army Regulations. These orders will be strictly obeyed by all men on duty at First Division hospital, and any infraction thereof will be punished as a court-martial may direct.

General Orders, No. 18, January 10, 1899:

The commanding officer of the hospital corps company will cause the detail to be made of one man for duty at the crematory until further orders to the contrary.

General Orders, No. 19, January 11, 1899:

First Lieut. R. W. Montelius, assistant surgeon, Eighth Pennsylvania Volunteer Infantry, is hereby detailed as summary court officer at the First Division hospital, vice Lieutenant De Costa, Eighth Pennsylvania Volunteer Infantry, relieved this date.

General Orders, No. 20, January 11, 1899:

The chief nurse will at once detail a female nurse for duty in pavilions Nos. 4, 5, and 6 for day duty, and one female nurse for duty in pavilions No. 4, 5, and 6 for night duty, if available. Ward 6 to be supplied, in any case, with a day and night nurse.

General Orders, No. 21, January 11, 1899:

The commanding officer, hospital corps company, will detail one man of his company for duty in the receiving ward as orderly, this date.

General Orders, No. 22, January 12, 1899:

The commanding officer of the hospital corps company will assign Acting Hospital Steward Weidmeyer to duty, on ward duty, in pavilion No. 5, this date.

General Orders, No. 23, January 12, 1899:

The commanding officer of the hospital corps company will detail an orderly for pavilion 6, for duty in the isolation ward of the First Division hospital at once.

General Orders, No. 24, January 16, 1899:

All gambling is strictly forbidden in the wards of the hospital, and acting hospital stewards and ward orderlies in charge of wards will be held responsible for any infraction of this order.

General Orders, No. 25, January 17, 1899:

The leave of one hour granted to acting stewards in charge of wards, per paragraph 4, General Orders, No. 4, December 3, 1898, is hereby revoked and modified to read that they will be required to be on duty at all times during the day, excepting meal hours, unless properly excused by the surgeon of the ward.

General Orders, No. 26, January 17, 1899:

The commanding officer hospital corps company will send Privates Weston and Dermont to report to Major Woodbridge, in the consulting room of this hospital, each day, until further orders, for the preparation of reports.

General Orders, No. 27, January 26, 1899:

Miss Mary J. McCloud is by this order made acting chief nurse and authorized to make all details and assignments for date.

General Orders, No. 28, February 13, 1899:

The orderlies and clerks on duty in the office of this hospital will report thereat every morning at [illegible] a. m. and remain on duty until 7 p. m. each day, unless specially excused by Steward Riess. They will not leave the office all at one time, but must arrange between themselves as to their meals, so that one clerk and one orderly is in the office at meal time. The night orderly must remain on duty until 7 a. m., or until he is relieved by the day orderly.

This order will take effect to-day, and will be strictly obeyed in the future.

General Orders, No. 29, April 10, 1899:

In compliance with Order No. 101, Camp Mackenzie, Ga., dated April 9, 1899, the hours for receiving patients having been changed from 3 p. m. to 9 a. m. each day, the receiving physicians will in future remain in the receiving ward from 9 a. m. to 10 a. m. for the receipt of patients sent to this hospital.

General Orders, No. 30, April 24, 1899:

Surgeons on duty in the wards of this hospital will in future turn in the clinical histories when the bed cards of the patients discharged are turned in. These histories must be on hand to revise the patient's diagnosis when his case is disposed of in the office; and, under orders from the chief surgeon, Second Army Corps, must be filed in the office of this hospital.

The hospital of the Second Division, Second Army Corps, was established at Greenville, S. C., November 10, 1898, and discontinued April

27, 1899. The division consisted of the Two hundred and first and Two hundred and third New York, the Fourth New Jersey, Second West Virginia, Fifth Massachusetts, and Fourth Missouri Infantry. Maj. John L. Phillips, brigade surgeon, volunteers, was in charge of the hospital, which consisted of four wards of 40 beds each, an administration building, dining room, mess kitchen, and other necessary buildings. During its occupancy 726 cases were treated, among which were 101 venereal, 97 mumps, 96 bronchitis, 89 pneumonia (both lungs invaded in 19 cases), 70 influenza, 67 measles, 25 typhoid fever, 5 scarlet fever, and 2 diphtheria. Cases of contagious diseases were isolated and treated in tents. Measles and mumps came almost exclusively from the West Virginia regiment. The cases of typhoid fever were contracted before coming South. No case of the disease was admitted after the middle of December, and the last cases admitted—three within a few days of each other—were from the last regiment to leave Camp Meade, Pa., about November 18. Twenty-five deaths occurred at the hospital—23 soldiers and 2 civilian teamsters. The causes of death were croupous pneumonia 16, and 1 each from typhoid fever, acute ascending myelitis, acute endocarditis, acute fibrinous pericarditis, epithelioma of bladder, cardiac dilatation with anasarca, acute nephritis, injury from crushing by machinery, and empyema after surgical operation. One half of a ward, 20 beds, was equipped for surgical cases and proved ample for their accommodation. Medical supplies were abundant and of good quality. The cost for each patient per day was about 45 cents.

REPORT OF LIEUT. COL. A. C. GIRARD, CHIEF SURGEON OF VOLUNTEERS, TO THE SURGEON-GENERAL UNITED STATES ARMY, ON THE CONDITION OF THE SECOND ARMY CORPS, FROM SEPTEMBER 29, 1898, TO MARCH 17, 1899.

I have the honor to submit herewith the report of my office as chief surgeon of the Second Army Corps from September 29, 1898, date of my last report,[1] to the present date, when the troops of the Second Corps are about mustered out. A recapitulation of the state of affairs at the date of my last report will serve to the better understanding of the work of the office of the chief surgeon.

The Second Army Corps was then camped at Camp Meade, Pa., upon rolling ground extending into the hills of the Susquehanna. The corps had been moved to that place by rail from Camp Alger, the movement commencing on the 16th of August and terminating early in September.

Upon my recommendation, the camping grounds on the first level of the Susquehanna banks which had been selected by the commission ordered to examine camping grounds for the Second Army Corps were not used for camps, as malaria is prevalent on the bottom of the river. Subsequent experience showed that this precaution was effective in protecting the command against malarial diseases.

The camp extended from the third bench into the hills, and as the ground was very much broken the camp sites were considerable distances apart and the whole camp covered in the neighborhood of 10 miles. The camp was laid out with great care by the Engineering Department, giving full distance between tents, large company streets, and, what I consider a very important innovation, placing of the kitchens at the side of the camp opposite to the location of the privies, in which manner access to the food by the flies which might carry infection from the privies was rendered more difficult. The sanitary precautions with regard to the care of the privies which had been instituted at Camp Alger were carried out in a vigorous manner, a sentinel at each privy requiring individual covering of fecal matter. In order to add to the military supervision of this important sanitary measure, I detailed a contract surgeon to visit as many privies each day in the camp as he could and to submit a written report of any violation of orders concerning their care. A communication was written by me to the Adjutant-General whenever any laxity in that respect was observed, and the regimental commanders were taken to task by the commanding general.

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[1] This report was published in the Report of the Surgeon-General of the Army for the fiscal year ended June 30, 1898, pages 153-160.

In order to guard against any possible infection of the water supply, which by this time had been distributed by pipes in each camp, and to train the troops in the use of filters, which, in case of foreign service, would have to be relied on greatly in the purification of the water supply, the use of filters was continued in all of the camps, each company having a set under the care of a reliable man and under the general supervision of one of the medical officers of the regiment. In order to insure intelligent use of the filters and prevent neglect in that respect, I had an efficient medical officer detailed as inspector of filters, who was to visit as many regiments as he could each day and make me a daily report of his work; the same officer was to satisfy himself as to the condition, handling, and preparation of the food in the companies.

In spite of all these precautions typhoid fever became more and more prevalent, especially as a number of regiments, which took the place of mustered-out ones, came from camps where typhoid fever was prevalent; as, for example, the Fifteenth Minnesota upon its arrival in camp sent at once 40 cases to division hospital, most of which eventually developed typhoid fever. The division hospitals were becoming overcrowded, and a double problem had to be met—one was to give the men proper care, and the other, in view of the rumored removal of the Second Army Corps to the southern camps later in the fall, to avoid having a large number of sick who could not be moved with the command, and neither in that climate could be left in camps.

I therefore systematically transferred all typhoid cases, as soon as diagnosis could be made, under authority of the commanding general and with permission of the Surgeon-General, to civil hospitals at Harrisburg, Lancaster, Norristown, Pottstown, Pottsville, Yorktown, and to the large hospitals in Philadelphia, all of which institutions, from a sense of patriotism, opened their doors and solicited the sick from Camp Meade.

I equipped two passenger cars as hospital cars and made a regular detail of medical officers and men of the hospital corps upon the Pennsylvania road, and later in the same manner on the Reading road. While, in the commencement of this gradual evacuation of the sick, hospital trains were sent out by the Red Cross Society and the National Relief Commission, this became less necessary, as I had at my command the facility of moving 48 patients a day. The shipping of these patients, the proper care for their clothing, preparation of descriptive lists, and necessary lists of patients, and to prevent any mishaps by delay in return of the cars and in transferring the patients upon their arrival to the different hospitals, required a constant careful supervision with which I found I could intrust no one, and which greatly taxed my energy. I made a daily trip to the division hospitals and saw each patient, unable, of course, to make a diagnosis, but thereby succeeded in impressing upon the medical officers an expectation of constant supervision; consequently there was no delay in shipment of the cases in the early stages and the proper care in the shipment. I have no doubt in this manner many lives were saved.

In order to take care of the typhoid cases, which had either entered on the second stage on being transferred to the division hospitals, or those who were unable to bear the railroad journey, I gradually enlarged the Red Cross Hospital, which had been kindly tendered by the Associate Red Cross Society of Philadelphia. The nurses in this hospital had been carefully selected by the society, and their work and services were of a superior character, and many lives were saved thereby.

By steadily pursuing this course at the time the Second Corps was ordered to the South the hospitals were vacated and no sick had to be transferred.

About this time another problem appeared—the enlargement of regimental hospitals with a view of their being more useful as detention or emergency hospitals, and susceptible of still greater enlargement should the regiments when in foreign service be camped at separate stations. It was no small task to supply this equipment, as the medical officers of the regiments had not learned yet to distinguish between the supplies of the Quartermaster and Medical Department, and correct requisitions were difficult to obtain. I had, unfortunately, no trained division surgeons as yet, and in order to carry out the plans of the Government had to deal directly with the regiments if I wanted to have orders carried out. This greatly increased my work, which already was onerous, by the shipment of the patients. The medical supply depot was of the greatest assistance to me in this respect, as the division hospitals would have been absolutely unable to provide the equipment or plan far enough ahead to obtain the articles in due time.

The next problem presenting itself was to provide for the sick in Southern camps and have everything ready on the arrival of the troops. For this purpose Maj. J. L. Powell, who had shortly before reported at the corps, and Maj. J. L. Phillips, who had wound up the first division hospital, which had been left with the sick of the corps at Camp Alger, were ordered to the South to superintend the construction of pavilion hospitals, at Augusta and Greenville, where the larger number of troops were to be camped. I sent a carload of medical supplies and equipments to each of these hospitals with a number of men of the hospital corps to make the necessary preparations, and to the smaller camps, such as Summerville, Columbia, and Athens, sufficient tentage to establish brigade hospitals on box frames.

In order to provide the sick of the regiments with the necessary comfort on the road, as the trip was to last three days, I had a passenger car in the third section of each train stripped of the seats and equipped with the beds of the regimental outfit. Under orders of the commanding general I inspected each train before it left the station, which was very fortunate, as, with the usual carelessness of the volunteers, the order for the equipment of the hospital cars had either not reached the regimental surgeons or, wherever possible, an erroneous construction was put upon it.

I was directed to provide a medical officer for each section of the trains, a necessary measure which entailed considerable work, as, from the lack of administrative ability of brigade and division surgeons, I did not have the necessary information as to the needs of the regiments, many of which had but two medical officers, and again I had to deal directly with the regiments. Only one section of a train was overlooked in this arrangement, through the carelessness of the regimental medical officer in not reporting to me the absence of one of his surgeons, but no mishap resulted from this oversight.

Prior to entering upon the move I had all the hospital tents, as rapidly as they were vacated, sent to a tannery in Middletown to be disinfected by boiling in its vats, and no tents were taken South infected with typhoid poison. In like manner I had all the blankets in the hospitals which had been used with typhoid cases sent to a steam laundry in Harrisburg and properly steamed.

Having been informed that the Third Division was going to be organized, with headquarters at Athens, and that a division hospital building had been erected there, I caused a full equipment of medical supplies, ambulances, and horses, with a sufficient detail of medical officers and men of the hospital corps, to be sent there.

The camps in the South were again as much superior to those at Meade as these had been to those at Alger. In a short time kitchens, mess halls, wooden privies, and storehouses were erected. The same sanitary supervision was continued as in the camp at Meade, and very few cases of typhoid fever appeared thereafter among the troops. Shortly after the arrival of headquarters in Augusta I was ordered to accompany the commanding general on an inspection tour of the different camps of the corps, and found, as a rule, the regimental hospitals fully equipped and well managed, while the records had been more or less defective for some time. My duties being much lighter since I was relieved of the necessity of personal supervision of the camps and the supervision of the transfer of the sick, I could pay more attention to enforcement of correct records and proper military correspondence, and by the time the regiments were mustered out the administrative part of their duties had been fairly well mastered by the regimental medical officers.

The Third Division being under orders for Cuba, at the time composed only of three regiments, I caused a full equipment for a division hospital to be shipped to Savannah, Ga., and had 100 men of the hospital corps, who unfortunately were recruits and had not yet received any training (a matter which could not be helped, as all the trained men were needed for the sick of the corps), to accompany this hospital. Under instructions of the Surgeon-General to increase the regimental equipment of the troops going to Cuba to fifty beds, I had a separate carload of supplies sent from the corps supply depot to meet each of the regiments on their arrival in Savannah, so that each regiment would find its equipment and be able to ship it on its steamer. It happened that only the Two hundred and second New York went to Cuba, while the other two regiments were to be mustered out. I therefore had the two carloads destined for these regiments turned over to the supply depot in Savannah.

All this happened soon after our arrival in the South; and as I was ordered by the Surgeon-General to discontinue the corps supply depot, I divided the six months' supplies which had been accumulated among the division and brigade hospitals and closed the depot.

HOSPITAL CORPS.

About the time this report begins the hospital corps had been so much reduced by muster out of regiments and disinclination to transfer from the twelve new regiments which had joined the camp at Meade that a great part of the work at the division hospitals had to be performed by details from the regiments.

A recruiting detail had been ordered to Minneapolis, Minn., and as the recruits were coming in too slowly to replace the constant drain caused by discharges, a second recruiting party was sent to Buffalo, N. Y., and later to Columbus, Ohio, to enlist for the hospital corps desirable men from mustered-out volunteer regiments. In this manner, shortly after our arrival South, recruits for the hospital corps arrived in considerable numbers, and in order to give them the necessary instruction prior to their entering upon duty in division hospitals or regiments, as the number of the sick of these hospitals was small, I organized again, with the approval of the commanding general, the school of instruction, which had been started at Camp Alger and had been broken up by the necessity of employing the corps reserve ambulance company, with which this school was started, in the hospitals at Bristow, Fort Myer, and Meade. This school gradually comprised about 250 men, and was at first under my immediate control, with a number of acting assistant surgeons as instructors in first aid, litter drill, and nursing. I succeeded in securing the detail of Maj. Edgar A. Mearns, brigade surgeon, United States volunteers, assistant surgeon, United States Army, as commandant of this school, and under his zealous and intelligent supervision the instruction became so well systematized that in about a month a number of the men could be graduated. In order to impart to the line of the Army information as to the purpose of this school and to raise the feeling of self-esteem and professional pride in the members of the hospital corps, I made this first graduation an occasion of solemnity, with public exercises in a hall, which had been kindly tendered me by the Young Men's Christian Association in Augusta, and distribution of certificates of graduation by the commanding general. Of this class a number of men were sent to Manila, and others assigned for practical instruction at the bedside to the division hospitals, under the supervision of the trained female nurses.

Meanwhile other recruits arrived, the instruction of the school was continued, and it will be able to leave as a legacy of its work, ready for assignment, 250 men, of whom a large number will prove very competent nurses.

During my administration 1,727 men of the Hospital Corps were received, transferred, or enlisted, of which at the present date not more than 150 are in the division hospitals, the remainder being either transferred or discharged. This does not include those who after enlargement of the regimental details were transferred from the regiments and immediately assigned to them. Quite a number of men (the exact figures are not accessible to me) contracted typhoid fever, and a small percentage died.

FEMALE NURSES.

During the days of Camp Alger, Miss Barton offered the commanding general female nurses for work in the division hospitals. I refused this assistance, partly because I was then under the belief that we were preparing for active service, and female nurses would be too much of an impediment in operations in the field. I was then not very much impressed with the advantages of nursing of this character, as I never had had any experience with it; I learned better when I compared the work of the female nurses in the Red Cross hospital at Meade with that of the men of the hospital corps in the division hospitals. At that time the advantages of female nurses became more generally recognized throughout the Army; and when the Surgeon-General informed me that female nurses could be employed in Southern hospitals I availed myself, however to a limited extent, of this opportunity, and used the nurses more as instructors and superintendents of wards than was done in most army hospitals at that time.

There was still an expectation of active service, and as the hospital corps had been recruited up to the full allowance, I deemed it of greater importance to have them benefited by the training of these nurses than to do simply the menial work, while the nurses attended to the sick. I therefore did not deem more than ten or twelve female nurses desirable for each division hospital, and found that the number was sufficient.

As a rule their behavior was satisfactory and their work commendable, but they were an expensive luxury, as they received more wages than the men of the hospital corps, and required much waiting on.

WORK IN OFFICE.

Applications for discharge, certificates of disability, weekly and monthly professional reports, monthly personal reports, inquiry for missing men, claims for lost property, accounts for washing and disinfectants, requests of acting assistant surgeons for annulment of contracts, and large numbers of miscellaneous papers have kept this office working at full capacity, and at no time could the work have been completed in ordinary office hours.

Watching for regular rendition of reports and notices to delinquents caused endless correspondence. Especially was this the case in the monthly reports of sick and wounded, and personal reports, the latter of which I ordered sent to my office in order to insure their receipt in the Surgeon-General's office.

I continued to the very last the scrutiny of certificates of disability by reexamination through medical boards, commenced in the early days of Camp Alger, and believe that thereby not only was justice done to the men, but the interests of the Government as to pension claims were protected.

In order to add to prevention of fraud hereafter and increase the meager information supplied by the reports of sick and wounded, I ordered in the division hospitals, from the very commencement of my administration, clinical histories to be kept on separate sheets for each patient, with particular reference to the history of the disease or injury. The sheets, on the discharge of the patients, were ordered to be filed alphabetically, by regiments, to facilitate scrutiny by the Pension Bureau in eventual pension claims. Unfortunately, with the lack of subordination usual among volunteers, some surgeons thought to improve on my system and had the clinical histories kept in books, which will greatly delay the search of these records.

I had a monthly tabulated statement of subsistence sent to my office from each regimental and division hospital, and found that the average cost daily of each patient in the former is 27 cents and in the latter 48 cents.

I also had the corps medical supply officer, prior to closing up, prepare a tabulated statement of monthly issues of expendable articles to regimental hospitals. As this comprises about forty regiments, the mean will prove a valuable basis in eventual revision of the field supply table. The compilation was not completed yet when the supply officer was sent to Havana, but it will probably soon follow his report.

The health of the command has been steadily improving. Systematic efforts were continued by me in bringing about complete protection against smallpox by liberal vaccination, the instruction being that every man who had not been vaccinated since his service in the Army was to be vaccinated. The result has been that, while some thirty cases of smallpox have appeared in the city of Augusta since arrival of the corps, only one man became infected, and he was a recruit of the reserve ambulance company who had been vaccinated on arrival but unsuccessfully, the vaccine matter being inert from being kept too long, as a like result in other cases proved. This man was sent with a special nurse from his company, who had had the disease, to the smallpox hospital in Augusta, where he is recovering. The hospital in the reserve company was carefully disinfected, the inmates who had been exposed isolated in a separate tent, and the whole company quarantined for two weeks. This quarantining is still kept up at the date of this report, and no more cases have appeared.

Measles and mumps had appeared in isolated cases all over the camp, but by careful isolation and disinfection spread was prevented, with the exception of the Thirty-fifth Michigan, where the former disease became epidemic. Under the instruction of the commanding general, I made a sanitary inspection of the regiment and found that proper precautions had not been taken to prevent the spread of the measles, which was rectified on my report. The disease had, however, become so general that the results were not as satisfactory as desired, the regiment having been recruited in country districts offering too much unprotected material for infection. It is believed, however, that the spread of the disease has been checked.

CONTRACT SURGEONS.

During the month of October, boards of medical officers were convened in the divisions for the examination of the contract surgeons under the instruction of the Surgeon-General, approved by the Secretary of War. Quite a number resigned under various pretexts, evidently afraid of the examination; others were found deficient and their contracts annulled. These boards were convened from time to time to examine new men who were appointed to fill vacancies.

Under the order that no regiment should be left with less than two medical officers, it was frequently found necessary to supply the place of regimental surgeons with contract surgeons. This order made the former rarely available for hospital service, and necessitated the contract employment of between twenty and thirty of the latter class.

As a rule, they adapted themselves with great credit to the most varied assignments, in addition to their professional duties, such as property officers in command of hospital corps companies, as sanitary inspectors, as executive officers, and by their zeal and efficiency raised themselves in the esteem of the volunteer medical officers, who, in the early days of the war, did not consider them good enough to share in their mess.

I recommend that this class of medical officers be placed on the same footing as acting assistant surgeons of the Navy, by a warrant issued by the Secretary of War, so as to indubitably establish their military status.

As to the state of health of the command, it was steadily improving from the date of commencement of this report, as will be seen from the following statement of admissions in the division hospitals:

Month.	First division.	Second division.
October	687	668
November	253	264
December	146	147
January	141	114
February	138	149

The greater rate of disease in February is due to the appearance of measles.

THE THIRD ARMY CORPS.

Lieut. Col. J. Van R. Hoff, United States Volunteers, was chief surgeon of this corps. So far as it was organized, this command was encamped in Chickamauga Park, Georgia. Its camp conditions were similar to those which have been described as existing in the First Army Corps. In July many cases of typhoid fever occurred among the men, and the division hospitals, organized and equipped for campaigning purposes, speedily became converted into stationary hospitals, which received the overflow from the regimental hospitals. The First Division had a staff of 5 medical officers, with 95 members of the hospital corps. Thirty hospital tents were floored and in use as wards, but this number was insufficient. To afford shelter to all, eight and even ten patients were crowded into one tent. The best feature of this hastily organized hospital was its special diet kitchen, which was reported as excellent. Cases were transferred as a relief measure to the Leiter and McPherson general hospitals.

In the Second Division the outbreak of typhoid fever took place before the regimental hospitals were broken up. Many of these were maintained as stationary rather than field hospitals, on account of the prevalence of serious cases of disease among the men. The division hospital had accommodations for 285 patients, with a force of 8 medical officers, 6 stewards, and 138 privates of the hospital corps. The general condition of this hospital was reported as being very good. Its streets were broad and well policed, and the general police of the camp was excellent.

Some of the regiments of this corps, before being mustered out, were moved into winter quarters at Camp Shipp, Anniston, Ala., where the headquarters of the Fourth Army Corps were established early in January, 1899.

THE FOURTH ARMY CORPS.

A few regular and volunteer regiments concentrated at Mobile, Ala., formed the nucleus of the Fourth Army Corps, Lieut. Col. R. M. O'Reilly, chief surgeon. A division hospital of 200 beds was established here, but shortly afterwards the corps moved to Tampa and Fernandina, Fla. Tent hospitals were pitched and an excellent reserve ambulance company was manned and equipped for service with troops expected to operate in Cuba or Porto Rico. The sanitary conditions in the camps at Tampa were not good. The division hospital had to be relieved by removing serious cases, in the hospital train of the medical department, to the general hospital at Fort McPherson, Ga., and later the troops were removed to the vicinity of Fernandina, where division hospitals were again formed. Later in the year the corps was established at Huntsville, Ala., and afterwards its headquarters were transferred to Anniston, Ala.

The hospital of the Second Division, Fourth Army Corps, was established at Camp Shipp, Anniston, Ala., in October, 1898, and closed in April, 1899. At first this was a tent hospital, but wooden buildings having a capacity of 250 beds were soon constructed. The hospital proper consisted of a corridor 200 feet long, with a convalescents' sitting room at the end, opposite to the main entrance. On either side of this corridor, and at equal distances from each other, were four wards, each 60 feet long, 24 feet wide, and 10 feet to the eaves, with ventilation by the ridge. They were heated by two large stoves for each ward and were quite comfortable in the coldest weather. One ward was fitted up for surgical cases. A separate building, with a capacity of 50 beds, was provided for typhoid-fever cases, two small isolated wards for cases of measles and mumps, and a room for disinfection by formaldehyde. There was a general mess hall for the members of the hospital corps and convalescent patients, with a special-diet kitchen, quarters, offices, and storehouses. Water was supplied from the citywater works. The surface drainage was good. Deep pit closets were used, with quicklime as a disinfectant. Wastes were collected in covered barrels and hauled away daily. The staff and employees consisted of a commanding officer, Lieut. Marshall M. Cloud, assistant surgeon, United States Army; an executive officer, 4 acting assistant surgeons, a quartermaster, who was a line officer from one of the regiments; a hospital steward, 10 acting stewards, 150 privates of the hospital corps, and 23 female contract nurses. The detachment of the hospital corps was organized into a company, which facilitated matters very much in the way of discipline. The guard was furnished from one of the regiments, the hospital having its own guardhouse. A trained cook was in charge of the special-diet kitchen. The average daily cost per patient was about 28 cents. The cases treated were mostly of a serious character, as trivial cases were retained for treatment in the regimental hospitals. They numbered 1,009, of which 33 ended fatally. There were 93 cases of typhoid fever, with 14 deaths; 40 of pneumonia, with 10 deaths; 13 of cerebro-spinal meningitis, with 7 deaths; 2 of endocarditis, and 2 of appendicitis, with 1 death from each of these diseases. Among the nonfatal diseases there were 178 cases of measles, 83 of mumps, 146 of remittent fever, 69 of intermittent fever, 61 of venereal diseases, 45 of rheumatism, and 34 each of bronchitis and influenza. Thirty severe typhoid-fever cases were received from the hospital of the Third Corps, and as the slighter cases of this disease were retained to convalescence in their own corps the rate of fatality of the 93 typhoid-fever cases above mentioned is made to appear higher than it really was. The death rate of the typhoid-fever cases admitted directly from the regiments was only 9 per cent; that of cerebro-spinal meningitis was 53 per cent.

A hospital was established August 18, 1898, at Huntsville, Ala. This hospital was organized June 7, 1898, at Tampa, Fla., to receive sick from the regiments then embarking for Cuba. At this time it was called the Provisional Division Hospital, Fourth Army Corps, and later the Field Hospital of that corps. It consisted of hospital tents, which were floored June 25, and its capacity, as measured by the number of cots, was 200. The hospital railway train relieved it on several occasions by carrying its serious cases to Fort McPherson, Ga. The establishment was afterwards moved to Huntsville, Ala., as stated above, where Lieut. Carl R. Darnall, assistant surgeon, United States Army, was in command. It was here called the Reserve Hospital, Third Corps. Three hospital stewards, 6 acting hospital stewards, and 59 privates of the hospital corps, with 2 trained nurses and 9 civilian teamsters, were on duty at this time, but early in September 45 contract nurses (Sisters of Charity) were added to the nursing force. On November 10 the name of the establishment was changed to the First District Hospital, Fourth Army Corps. In December solid frame pavilions, roofed with hospital canvas, 42 by 15 feet, were constructed, each heated by two stoves and ventilated by air shafts in the ridge. The wards, capacity 300 beds, were arranged on each side of a street 25 feet wide. In this hospital, from June, 1898, to January, 1899, there were treated 3,006 cases, of which 77 were fatal. There were 1,067 admissions for malarial fever, 1 fatal; 776 for typhoid fever, 45 fatal; 266 for measles, none fatal; 192 for diseases of the respiratory organs, 9 fatal; 183 for wounds and injuries, 7 fatal; 162 diarrhea and dysentery, 3 fatal, and 112 for venereal diseases, none fatal. The rate of fatality of typhoid fever as given above is misleading. Of the 776 cases 358 were admitted at Tampa and 418 at Huntsville; of the former 11, or 3 per cent, while of the latter 34, or 8.1 per cent, proved fatal. At Tampa the cases were kept only a few day, and were then sent away on the hospital train. At Huntsville the cases were treated throughout the whole course of the disease.

The Second District Hospital, Fourth Army Corps, was in existence for a short time in the old Alabama Military Academy, a three-storied frame building of barn-like appearance, situated on a slope overlooking the city of Huntsville, about half a mile distant. The immediate surroundings, consisting of cotton and corn fields, were not very attractive. The condition of the building was fair. It contained 52 rooms, 3 of which were large enough for wards, each accommodating about 30 patients. The other rooms were used for administration purposes, diet kitchens, officers' quarters, nurses' apartments, and convalescent and isolation wards. By the use of tents the capacity of this establishment was increased to 200 beds. Maj. H. S. T. Harris, brigade surgeon, Volunteers, was in charge of this hospital.

THE FIFTH ARMY CORPS.

During the latter part of April, 1898, a concentration of regular regiments was effected in the vicinity of Tampa, Fla. These included the Second, Fourth, Sixth, Seventh, Eighth, Ninth, Tenth, Twelfth, Thirteenth, Sixteenth, Seventeenth, Twenty-first, Twenty-second, Twenty-fourth, and Twenty-fifth United States Infantry. They were organized into two divisions, which, with a cavalry division, General Bates' Independent Division, and some light batteries, constituted the corps.

The vaccination of these troops began early in May and was continued without intermission until the protection of the whole command was assured.

As stated in my last annual report (p. 116), the organization of the divisional hospitals for field service was begun May 3, 1898. Long before the corps embarked for Cuba its field hospitals were in condition for efficient service, and although its ambulance companies were not filled up to their intended strength nor fully equipped with ambulances, wagons, horses, and harness, such sections of them as had their equipment completed were well drilled in hospital-corps work and ready for active service. Each hospital had about eight 6-mule wagons to haul its tentage and supplies. The equipment of the Second Division hospital was completed at an early date. It contained 85 cots, with a sufficiency of furniture and necessary fixtures, and as the demand for extra accommodations increased the capacity of the hospital was augmented to 150 beds. The operating tent was provided with enameled steel folding operating tables, steam sterilizers and water heaters, bath tubs, and other necessary appliances. The hospitals of the First and Third divisions and of the cavalry division were similarly outfitted. In addition to these hospitals certain medical supplies, with 1 acting steward, 1 private, 1 hospital and 1 common tent, 1 ambulance wagon, and the necessary animals fully equipped, were retained as a minimum allowance with each regiment.

Subsequent events, however, rendered valueless these preparations of the medical department for active service in Cuba. When the command embarked on the transport vessels the baggage wagons and mules were left behind, "and were never seen again by the medical department of the Fifth Army Corps."[1] The ambulance trains of all the divisions, with a large part of the outfit of each of the hospitals, were also left behind. Three ambulance wagons were taken apart and stored on one of the vessels. These did excellent service at San Juan and El Caney, and showed how efficient the ambulance companies would have been had they not been deprived of their equipment. Ten of the ambulances of the third or reserve divisional hospital were subsequently shipped to Cuba, where they arrived July 2, and were of value in moving the sick and wounded to the hospital at Siboney, and to the hospital ships and transports. The ambulance service of the division hospitals of this command was thus practically destroyed by these failures to embark or disembark its wagons, harness, horses, and mules. Part of the tentage and property of the hospitals was left at Tampa with the sick left there. Of the property and supplies carried to Cuba, a portion was not available for service at the time it was most needed, to wit, on July 1, 2, and 3, when the wounded from El Caney and San Juan were coming from the front for care and treatment. This was because, in general, no opportunity was afforded to land the medical property, because there was no transportation on shore for such articles as might be landed, and because the masters of transports took their vessels out to sea after the debarkation of the troops because of their fear of wreck by collision with each other or by drifting on the rocks. Earnest efforts were made by medical officers to have supplies at the front with the troops. Some having succeeded in getting their medicine chests and other articles of medical property ashore, had these carried forward on litters by hospital-corps men to the camps near Sevilla, while others turned their private mounts into pack horses for this purpose. A reserve supply of medicines shipped on the *Seguranca* from the purveying depot at Tampa was landed June 27. These, issued to regimental medical officers, materially relieved the stress caused by the failure to land their regimental medicine chests.

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[1] Report of the chief surgeon.

The tents and property of the First Division hospital were landed by the efforts of the hospital-corps men, under the direction of Maj. M. W. Wood, surgeon, United States Army. The hospital outfit was carried to the front by hand and on litters used as handbarrows by the nurses and attendants.

The second field hospital landed was that of the cavalry division under Major McCreery, but the transport put to sea before the whole of the property was removed from her.

The Third Division hospital, which was landed from the *Saratoga* after many delays, afterwards became the base hospital at Siboney. To this were sent all the medical supplies recovered from the transports or landed from the hospital ship *Relief*. The fourth divisional hospital of the corps was retained on the steamer *Olivette*, which was thus extemporized into a hospital ship. The tents and camp outfit of this hospital were landed for service at Siboney. During and after the battles at El Caney and San Juan there was an insufficiency of tents, cots, bedding, and medicines, due to the causes already stated, but all the hospitals were well equipped for surgical work.

The Medical Department of the Army was severely criticised, at the time of the attack on Santiago, for its failure to have on hand all the material and equipment of field division hospitals in the immediate rear of the firing line of their respective divisions. But it will be seen from what I have already stated that this failure was in no part due to the carelessness or inefficiency of medical officers. Every preparation for an efficient medical service in Cuba was made by them at Tampa, Fla. The medical officers of this corps were not responsible that much of their material was left behind when the expedition sailed, nor for the rapid advance on Santiago while their medical and surgical supplies were on transports miles away from the landing place. The military authority which ordered and superintended the embarkation at Tampa and which directed the forward movement, although the disembarkation of the medical stores and supplies was unaccomplished, is responsible for the absence of medical preparation on the field at El Caney and San Juan Hill, and for the subsequent temporary scarcity of medical and hospital property and supplies at Siboney hospital, when the Fifth Corps broke down under exposure to climatic influences and specific infections. In time of war the military status and requirements determine the action to be taken. The military necessity may require an assault before the medical stores are on the ground, but the medical department is no more responsible for the consequent failure to have every comfort provided for the wounded than it is for the number killed and disabled in the attack. I feel confident, however, that had the medical department been charged with an immediate supervision over the transportation of its property and supplies, and held to a corresponding responsibility, the medical record of this campaign would have met with less adverse criticism. That the members of the medical corps did their duty at Santiago under exceedingly difficult conditions, with untiring energy and self-sacrifice, is recognized in every official report that has come to my notice.

I am of the opinion that at the time this expeditionary force was hastily dispatched from this country to Cuba, the difficulties attending such an undertaking were not fully appreciated by the people of the United States. The following extract from an address in surgery, delivered at the annual meeting of the British Medical Association, August 3, 1899, by Alexander Ogston, M. D., Aberdeen, from The Lancet, August 5, 1899, page 327, gives a graphic account of the confusion attending the dispatch of a small British force to the eastern Soudan in 1885:

> *The army medical service undermanned.*—This condition of things is one from which there must some day be a rude awakening. It may be true that in former days an army medical service could be so extemporized, but it is so no longer. The army medical corps ought to be made, what it is not, a complete and perfect entity, fully equipped with everything needful, and regularly trained like any other department. If it is to furnish the priceless service for which it exists, it must be fully manned; the members composing each of its units must be accustomed to work together, so that their duties are familiar and can be promptly performed, and the whole of its equipment must be prepared in time of peace for instant employment in war. Instead of this, we have a department so starved and undermanned that, as the under secretary for war recently admitted, in the event of a war breaking out requiring the employment of two army corps we could not supply them with the requisite medical contingent. Let me give an example of how the army medical service worked in an expedition of some 11,000 men, sent under Sir Gerald Graham to the eastern Soudan and landed on the Red Sea littoral in 1885. Following, as it did, on the death of Gordon at Khartoum, when the country was roused into excitement, many millions were spent upon it, and it was furnished with everything, even to hospital ships, at profuse expense, nothing being wanted to its medical department that money could supply or care provide. Yet in the bearer companies the men were from Aldershot, the carts and harness from Woolwich, the mules and muleteers were from Spain, dhoolies and dhoolie bearers were from India, and camels and camel drivers were from Aden. The wagons arrived in one ship, the harness in another, the mules in a third, and all at different times. When the ambulance wagons were landed, along with several carts, the pieces were mixed up, and the men had to fit them together as best they could. When the mules and harness turned up it was found that while the wagons were made for one kind of draft the harness was made for another, and so on. And the officers, noncommissioned officers, and men knew nothing of one another. For the medical part of the expedition generally, the stores came without storekeepers and without proper outward indication of what the packages contained. Chaos reigned, and I am assured that if there had been an engagement on the day the forces landed there would not have been a bandage forthcoming for the wounded. And very much the same state of matters exists in the service to-day. To manage in this fashion is simply to insure when a critical time occurs a repetition of the scenes of the Crimea, where admirable medical officers were made a sacrifice by the war authorities to appease the public indignation excited. A system that produces such results stands self-condemned, and none who remember the Crimean war will consider any efforts to prevent a repetition of like experiences ill timed or unadvisable.

In reading this summary of the difficulties encountered by a military nation in sending off a small expeditionary column, we have reason to feel gratified that no great disaster was encountered by the Fifth Army Corps. It is true that after its victory it succumbed to the fevers of the country, but the transference of the whole command to this country was effected not only without the introduction of the deadly infection into the United States, but without a disastrous outbreak on board of any one of the many transports used in effecting the transference. The reembarkation of the Fifth Corps began on August 8 and was completed on the 25th. A board of medical officers, consisting at first of Maj. H. S. Kilbourne, surgeon, United States Army, chief surgeon Second Division; Capt. H. C. Fisher, assistant surgeon, United States Army, and Acting Asst. Surg. S. M. Gonzalez, was appointed to make a careful inspection of each regiment and to exclude all cases, evident or suspicious, of yellow fever. This work was so laborious that the members of the board had to be changed several times on account of sickness, but it was carried on successfully to the end. Another board was directed to inspect all transports leaving Santiago, for the purpose of determining their sanitary condition, capacity, and needed supplies. Most of this work was done by Brigade Surg. F. J. Ives, United States Volunteers, who discharged it with energy and thoroughness. According to the report of the chief surgeon, Major Ives made it his duty to see that all necessary medical supplies were put on board each transport and that all suitable preparations were made for the sick, so that he was able to state, in truth, that he did not believe "an army ever before in the history of the world was more completely and comfortably equipped than the Fifth Corps in the voyage from Santiago to Montauk."

Maj. Valery Havard, surgeon, United States Army, chief surgeon Department of Santiago, has given the following account of the yellow-fever epidemic among the troops at Santiago during the summer and autumn of 1898:

> Much has been written about the epidemic of yellow fever which prevailed among the United States troops, from the first case at Siboney on July 6, to the last one at the yellow fever hospital on the bay, in November. All evidence tends to show that the number of cases was very large, and that after a time isolation became impracticable, so that whole regiments were exposed to the infection; thus toward the middle of August I inspected the Seventh United States Infantry, camped near Cuevitas and reported to be in an unusually sad plight. Out of 740 men 300 were sick, 250 with malarial fever and diarrhea and 50 with yellow fever; many other soldiers were reported to have had yellow fever and recovered, although, within ten days, six patients had died, presumably of this disease. An attempt had been made to separate infected cases, but a very imperfect one, although, under the circumstances, perhaps the best possible. In many regiments cases were recognized and isolated, but in many others cases were doubtless overlooked and treated as malarial fever. The fact that at least 75 per cent of all officers and men were incapacitated, that able-bodied surgeons were few and many of them inexperienced, explains what otherwise would appear like incompetency on the part of the Medical Department. It is to be wondered at that, under the circumstances, yellow fever did not assume the proportions of a violent epidemic and cause great mortality. But, in truth, the great majority of cases were of a mild type, with a mortality of less than 5 per cent; that is, hardly as great as that of malarial fever we were struggling against at the same time, and much smaller than that of our typhoid fever cases. The probable reason for this is that all troops were under canvas, scattered over many hills and freely exposed to air, sun, and abundant rains, conditions which are much more favorable to the development of the parasitic plasmodium than to the bacillus of yellow fever. In other words, yellow fever is a disease of towns and can not thrive in camps, as was again proved this summer. It is also true that the two infections were often coexistent in the same patients, so that the diagnosis was exceedingly difficult, especially in the absence of microscopes.
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> After August 1 no more cases of yellow fever were sent to Siboney; they were either sent to the bay hospital or, as already stated, treated in situ. In July 12 cases, and in August 49 were sent to the bay hospital (across the bay), all from the Fifth Corps; in September 35 were sent, in October 22, in November only 2. The cases for these last three months came from the Second, Fifth, and Ninth Immunes, stationed near the city and occupying several public buildings.

The condition of the hospitals of the Fifth Army Corps during and after the attack on Santiago, and at Montauk Point, Long Island, subsequent to the return of the corps to the United States, is fully set forth in my last annual report.

Prior to the hurried return of the Fifth Corps I had arranged for the establishment of a large general hospital for the care and recuperation of wounded and sick men sent home from Cuba and Porto Rico. This, the Josiah Simpson General Hospital, did excellent service during the past year. It is situated on leased ground on Mill Creek, an arm of Hampton Roads, nearly 3 miles from Fort Monroe and 2 miles from the town of Hampton, Va. Its site, embracing about 40 acres, is level, with a general slope to Mill Creek; the soil is a sandy loam. It is connected with Fort Monroe and the towns of Hampton and Newport News by an electric railroad, whose tracks connect with the Chesapeake and Ohio Railroad. It is thus in easy communication with steamers landing at Fort Monroe or Newport News by means of the electric railroad, and of access by means of the Chesapeake and Ohio Railroad to any part of the United States. The situation is salubrious.

The hospital was organized by Lieut. Col. A. A. Woodhull, deputy surgeon-general, United States Army, who assumed charge on August 12, 1898. The work upon the buildings was begun in July, 1898, under the supervision of an officer of the Quartermaster's Department, 30 buildings having been contracted for at this time. These consisted of 17 wards, 2 mess halls and kitchens, 1 administration building, 1 quartermaster and commissary storehouse, 1 mess hall and kitchen for female nurses, 1 building for laundry, a chapel, a guardhouse, a dead house, an operating building, a bakery, a stable and wagon shed, and 1 mess building and dormitory, this last having been intended for medical officers.

On September 26, 1898, these buildings had been completed to such an extent as to permit of the reception of patients, but it was not until October 5, 1898, that the first patients were received. These arrived on the hospital ship *Missouri* from Porto Rico and were 266 in number.

The buildings originally contracted for were frame structures, neither shingled nor weatherboarded, but were covered with tarred paper over the sheathing. No adequate quarters had been provided for female nurses or other civilian employees, medical officers, or the Hospital Corps detachment; but in September contracts were let for the construction of two buildings, one for officers' quarters and one for nurses' quarters, and these were completed in the latter part of October. Early in December contracts were let for the construction of two barrack buildings for Hospital Corps privates—one for hospital stewards and one as quarters for cooks. These were completed early in January, 1899. About this time, also, the thirty original buildings were shingled, weatherboarded, and painted. The wards and all buildings used as quarters are supplied with plumbing fixtures and bath tubs.

The water supply is obtained from the Newport News Water Company and is supplemented by a local supply from driven wells on the hospital grounds. This latter plant belongs to the Quartermaster's Department, and was at one time used to supply Fort Monroe. Water is distributed in mains to all buildings, and fire plugs are also provided at different points. A water-distilling apparatus, transferred from the general hospital at Fort Monroe, and having a capacity of 60 gallons per hour, supplies all the needed drinking water.

Connected with the hospital is an adequate system of sewerage which originally emptied into Mill Creek, but, owing to protests from owners of oyster beds in the creek, the system was changed, and the sewage is now pumped from receiving tanks through a pipe across Mill Creek into Chesapeake Bay. This change was effected in April last.

The wards are each 200 feet long, 23 feet wide, 12 feet in height at the eaves, and 20 feet to the ridge. They are unceiled, and are ventilated by eight 18-inch globe ventilators in the ridge, which also act as flues for stovepipes. Each ward has a capacity of 60 beds, thus giving a total capacity for the hospital of 1,020 beds for patients.

A covered walk 5 feet wide, in the shape of the letter V connects all the wards, which are disposed en echelon along its sides. The mess halls and kitchens, bakery, operating room, and administration building, are situated in the interior of the V and are connected therewith by covered walks. There are four mess halls and kitchens; two smaller for officers and nurses, and two larger for patients, enlisted men, and civilian employees.

In the administration building are contained, dispensary, bacteriological and chemical laboratory, printing office, post-offic, telegeraph office, and the offices for administration.

The hospital has its own laundry, with the necessary machinery. It has also a garbage cremator. The buildings and grounds are efficiently lighted by electricity from an electric plant at Hampton, Va. The hospitals has also its own side track from which patients, transported either by electric cars or railroad trains, can be conveniently unloaded.

The total number of admissions up to June 30, 1899, was 1,932—816 regulars and 1,116 volunteers. Of the regulars 492 were admitted from foreign stations and 324 from stations in this country. Of the volunteers 730 were admitted from foreign stations and 386 from stations in this country. The greatest number of admissions for any one disease was 573 from typhoid fever, with 151 convalescents from this fever. Malarial fever came next in frequency—526 admissions; intermittent, 214; remittent, 397; cachexia, 15.

The number of deaths among those admitted was 30, of which 9 were due to typhoid fever, 6 to dysentery, and 5 to tuberculosis. The other causes of death were: Chronic diarrhea, 4; malarial fever, 3; pyæmia following an operation for appendicitis, 1; parenchymatous nephritis, 1, and sarcoma, 1. Of these 30 deaths, 18 were regulars and 12 volunteers.

The number of surgical operations performed at this hospital was comparatively small, only 10 having been recorded. This is due largely to the fact that most of the surgical cases received here had been operated upon before their transfer to this hospital, and no hostilities had occurred after the opening of the hospital.

The personnel of the hospital has varied from time to time, the maximum number having been 4 medical officers, 11 acting assistant surgeons, 45 female nurses, and 158 men of the Hospital Corps. In addition to these there have been on duty 1 line officer, as quartermaster and commissary; 1 chaplain, 1 commissary-sergeant, and 1 sergeant of the Volunteer Signal Corps.

Lieutenant-Colonel Woodhull was relieved as commanding officer by Maj. Charles Richard, surgeon, United States Army, February 10, 1899.

At the close of the fiscal year but 14 patients remained in this hospital.

The work done in the laboratory, as reported by Acting Asst. Surg. Charles F. Craig, was as follows:

1. *Examinations for plasmodium malariæ.*—Two hundred and eighty cases were examined for the malarial parasite. The plasmodium was found in 80 of these, 55 of which are reported in detail, with drawings, in the Laboratory Record. The small proportion of cases showing the plasmodium is easily explained by the fact that every case in the hospital showing a rise of temperature after admission was immediately examined for the plasmodium, whether diagnosed malarial fever or not, and also by the fact that many cases were diagnosed as malarial fever on entering the hospital which were found not to be such. Quinine had also been

administered to many cases prior to an examination of the blood. The 80 cases in which the plasmodium was found may be classified as follows:

Thirty-nine were intermittent malaria of the tertian type, 31 being single infections and 8 double infections. Thirty-four cases were remittent malarial fever (æstivo-autumnal), 24 of which presented only the "ring forms" and small pigmented, intracellular parasites, while 10 presented crescents and ovoid, pigmented, free bodies. A majority of the cases of both types presented flagellated bodies. Five cases showed a combined tertian and æstivo-autumnal infection (intermittent and remittent malarial fever). Two cases presented quartan malarial parasites. Beside the above cases, there were two instances of the occurrence of a combined typhoid and malarial infection, in both the malarial complication being of the æstivo-autumnal variety.

2. *Widal tests.*—One hundred and forty-four Widal tests were made, in cases classified as follows:

(*a*) *Active typhoid.*—Seven cases of active typhoid were tested, in all of which the reaction was marked within ten minutes; in many, almost instantaneously. The earliest reaction obtained was at the seventh day.

(*b*) *Convalescents from typhoid.*—The reaction was tried in 28 convalescent typhoid cases, with the following results:

How long convalescent.	Number.	Results.	
		Positive.	Negative.
One month	13	12	1
Two months	4	3	1
Three months	6	4	2
Four months	3	1	2
Five months	1	1	0
Several months	1	1	0

Per cent of reactions, 92.
Case of acute diarrhea. Diagnosis doubtful.

(*c*) *In health.*—The Widal test was applied in the cases of twelve healthy individuals who had suffered from typhoid. In all of these cases the result was negative.

(*d*) *Cases of disease other than typhoid.*—Eighty-eight Widal tests were made in cases of other disease than typhoid fever, with the results shown in the following table. Per cent of negative results, 100:

Diagnosis.	Number.	Results.	
		Positive.	Negative.
Malarial fever (tertian and æstivo-autumnal)	34	3	31
Acute and chronic dysentery	4		4
Tuberculosis	3		3
Acute and chronic rheumatism	5		5
Gonorrheal arthritis	1		1
Wounds and operative cases	15		15
Insolation	2		2
Chronic gastritis	1		1
Syphilis	2		2
Otitis media	2		2
Gonorrhea	2		2
Corneal ulcer	3		3
Pleurisy	4		4
Convalescent typhoid	1		1
Adenitis	4		4
Varicocele	1		1
Gonorrheal opthalmia	1		1
Chancroid	1		1
Orchitis	1		1
Paralysis	1		1

Of the 3 which reacted 2 were suffering from typhoid, complicated by malaria. The other had had typhoid in June, 1898.

Besides the four classes of cases just mentioned, the Widal test was also tried with the blood of 21 negroes, in order to settle the question whether or not the reaction is always present in the blood of the negro, as has been maintained by some investigators, notably Brennan.

The following table shows the results obtained demonstrating conclusively that the blood of the negro reacts to the serum test exactly as does the blood of the white man:

Diagnosis.	Number.	Results.	
		Positive.	Negative.
Dysentery	1	0	1
Typhoid	2	2	0
Intermittent malaria	1	0	1
Remittent malaria	1	0	1
Orchitis	1	0	1
Paralysis	1	0	1
Typhoid complicated by malaria	2	2	0
Healthy	12	0	12

The two cases of a combined typhoid and malarial fever are described in the laboratory record, and show how little the malarial complication modifies the course of the typhoid.

3. *Examinations of urine.*—There have been examinations made of 170 specimens of urine. A large number of these examinations showed nothing of interest. Those which were of interest are given in detail in the record.

4. *Examinations of sputum.*—The sputum of 20 cases in which pulmonary tuberculosis was suspected was examined, in 7 of which the bacillus tuberculosis was demonstrated.

5. Under the class "Other examinations" are grouped those cases which can not be classified elsewhere, as examinations of sections of tissue, etc.

Special investigations.—There have been 8 special investigations pursued, the results of which are detailed in the laboratory record. They are:

1. An investigation as to the staining reactions of the tertian malarial plasmodium.
2. An investigation as to the staining reactions of the æstivo-autumnal plasmodium, especially the crescent forms.
3. An investigation as to the occurrence and nature of the flagellated malarial plasmodium.
4. An investigation as to the occurrence of the so-called Neusser neutrophilic granules in the leucocytes, in health and disease.
5. An investigation of certain bacilli separated from the liver and spleen of a case of septicæmic abscess of the liver.
6. An investigation of 2 cases of typhoid fever complicated by malaria, of the æstivo-autumnal type.
7. An examination, bacteriologically, of the water supply of the hospital.
8. An examination of sections of liver tissue in a suspected case of amœbic abscess.

Corrections in diagnosis.—In several instances the laboratory has been instrumental in correcting carelessly made diagnoses of disease. It is needless to say that many cases entering the hospital and diagnosed as malarial fever have proven not to be such, and that the various forms of malarial fever have been confused. The following list of corrections does not contain, by any means, the total of cases wrongly diagnosed, but only those in which actual laboratory examinations conclusively proved the error:

Four cases diagnosed "remittent malarial fever" were found to be typhoid fever.

Three cases diagnosed "typhoid fever" were found to be remittent malarial fever (æstivo-autumnal).

Four cases diagnosed "intermittent (tertian) malarial fever" were found to be cases of combined tertian and æstivo-autumnal fever.

One case diagnosed "remittent malarial fever" was found to be a case of combined æstivo-autumnal and tertian fever (remittent and intermittent fever).

Three cases diagnosed as "remittent malarial fever" were found to be intermittent (tertian) malarial fever.

Three cases diagnosed as "intermittent (tertian) fever" were found to be remittent (æstivo-autumnal) fever.

One case diagnosed "intermittent double quotidian fever" was found to be remittent (æstivo-autumnal) fever.

One case diagnosed as "octan malarial fever" was found to be a case of remittent (æstivo-autumnal) fever.

One case diagnosed as "intermittent quotidian fever" was found to be a case of intermittent tertian fever.

One case diagnosed "intermittent quotidian fever" was found to be a case of remittent (æstivo-autumnal) fever.

One case diagnosed as "remittent malarial fever" was found to be a case of intermittent (double tertian) fever.

One case diagnosed as "milliary tuberculosis of the lungs" was found to be a case of remittent malarial fever (æstivo-autumnal).

In closing I would report that the laboratory is well supplied with all necessary materials for carrying on research, and that the apparatus is in good condition.

THE SIXTH ARMY CORPS.

It was the intention to organize this corps at Chickamauga Park, Georgia. A corps staff was assigned, in which the Medical Department was represented by Lieut. Col. Nicholas Senn, United States Volunteers, but the medical reports show that the corps organization was not formed. On June 22, 1898, Lieutenant-Colonel Senn applied for active service, on the ground that the Sixth Corps did not exist. He was assigned as chief surgeon of the operating staff at Siboney, Cuba.

THE SEVENTH ARMY CORPS.

This corps was organized at Tampa and Jacksonville, Fla., Maj. Gen. Fitzhugh Lee, United States Volunteers, commanding. Headquarters were established first at Tampa, afterwards at Jacksonville until October, 1898, when they were removed to Savannah, Ga. The First Division, organized at Tampa, under General Henry, was subsequently transferred to the Fourth Corps, and the First Division of that corps, General Schwan's, at Miami, was assigned to the Seventh Corps. The Second and Third Divisions were organized at Jacksonville. The maximum strength of this corps was over 31,000, officers and men. The corps was vaccinated early in June and again after its arrival in Cuba, a number of men having joined since the previous vaccination. Only four cases of smallpox occurred during the existence of the corps.

As in the other corps of the Volunteer Army, a large number of men were found in certain regiments who were unfit for military duty on account of disabilities which existed prior to enlistment. This was due in part to the haste and carelessness with which the medical examinations were made at the time of muster in, and in part to the eagerness of regimental officers to have the muster in completed. The First North Carolina had 100 such cases, the Second Louisiana 90, the Fourth Virginia 56, and so for other regiments. The principal disabilities were occasioned by hernia, epilepsy, syphilis, heart disease, deformities, and hemorrhoids. From a statistical table furnished by the chief surgeon, it is found that no less than 747 men were discharged by boards for disability not incurred in the line of duty.

The First Division of the corps (originally the First Division of the Fourth Corps) while in camp at Miami, Fla., had a number of febrile cases early in July. These were at first regarded as remittents or continued malarial fevers, but they were soon afterwards recognized as true enteric or typhoid cases. The command was supplied with water from two sources, Everglade water, which constituted the city water supply, and water from driven wells only 10 to 15 feet deep. Both had a disagreeable taste and odor, but as the well water was cooler, it was preferred by the men to that from the city pipes. The large number of men on sick report in this division, suffering from diarrhea, dysentery, and a low form of fever, was generally attributed to the use of the well water, although here, as in most of the other volunteer camps in this country, the free use of soft drinks, pies, cakes, candies, watermelons, and unripe and stale fruits constituted fertile sources of gastrointestinal disturbances. The principal roads leading to and through the camps were lined with booths, restaurants, and stores of all kinds, the surroundings of which, as a rule, were unsanitary or even filthy.

The First Division was encamped on the St. Johns River; the Second was practically within the city limits, while the Third occupied a site in the district known as Panama Park, about 5 miles below the city.

The water supply of Jacksonville from an artesian well about 1,000 feet deep is excellent when freed by evaporation from the taint of hydrogen sulphide, which it possesses when freshly drawn. This is effected in an evaporating tank prior to distribution. This water was liberally supplied to every organization of the corps by a system of piping. The suburbs of the city were, however, largely supplied from shallow wells. Every negro shanty was provided with one of these wells dug within a few feet of a privy pit containing the undisturbed collection of years. That these had something to do with the propagation of typhoid fever in the corps was generally admitted.

The First Division had a sewerage system of 6 or 8 inch pipe, with a latrine of forty seats for each battalion, which was flushed from time to time into the sewer. The tub system was adopted in the Second Division, as the city board of health objected to the use of pits. The tubs, or half barrels, were arranged under an ordinary beam seat and when two-thirds filled they were removed through a swinging trap door, in rear, and carted to the city crematory. They were disinfected twice daily with carbolic acid or unslacked lime. The chief surgeon believed that the streets of several regiments became infected by the spilling of a certain quantity of the contents of the tubs during their removal. Later in the season this division had a large number of cases of typhoid fever. The pit system was in use in the Third Division. Great care was observed in the use of lime and earth to cover the fecal accumulations. Slops and kitchen wastes were collected in barrels and carted at least a mile from the camp. The sinks at Camp Onward, Savannah, Ga., were on the dry-earth system, but sawdust and unslacked lime were used instead of earth. The night soil was emptied from the boxes into turpentine barrels and carted 1 mile distant from camp, where they were thoroughly cleaned.

Early in June arrangements were made by Lieut. Col. L. M. Maus, United States Volunteers, chief surgeon, for the formation of three hospital corps companies, four ambulance companies, the establishment of division hospitals for field service, and the reduction of the regimental hospital system to a mere dispensary and emergency equipment. The same difficulty was experienced in this corps as in the others in obtaining men qualified for nursing and first-aid work. Three division ambulance companies were formed early in the summer, each consisting of 3 medical officers, 7 hospital stewards, 3 acting hospital stewards, and 104 privates. Later in the season a reserve company was organized. Each company had 12 ambulances, 14 escort wagons, 104 mules, and 22 horses. The commanding officers of these companies were directed to send an ambulance to each regiment at sick call daily to convey those requiring hospital treatment to the division hospitals. Three ambulances were also required to be kept in readiness for emergency calls at all hours. During September, when it became evident that the corps would be reduced in strength by the muster out of a number of the regiments, these companies were broken up and their personnel attached to the division hospitals.

When typhoid fever assumed an epidemic prevalence in August, and the division hospitals became stationary field hospitals, the nursing personnel was increased by about 150 trained female nurses.

The first field hospital organized in connection with this corps obtained most of its outfit and supplies from Tampa. Some delay caused by the embarkation of the Fifth Corps for Cuba necessitated the purchase of cots, bedding, cooking stoves, and other utensils in Jacksonville. All subsequent medical and hospital supplies for the corps were obtained from the medical supply depots in New York, N. Y., St. Louis, Mo., or Washington, D. C. According to the report of the chief surgeon, from about June 15, 1898, medical and hospital supplies were abundantly and promptly forwarded to the corps and, as a rule, by express. Not infrequently in less than two hours after sending a telegraphic request for supplies, a reply would be received stating that the articles asked for had been ordered and would leave that same day by express. A large building conveniently situated with regard to the troops, railroad depot, and wharf was rented in Jacksonville as a corps medical supply depot. Maj. James E. Pilcher, surgeon, United States Volunteers, in charge of this depot, was instructed to fill requisitions as they came in, with proper approval from regiments and hospitals, even if it was necessary to purchase in open market to enable him to do so. In addition to his supply of medical and hospital stores, this officer made requisitions for clothing and ordnance and horse equipments for the hospital corps, which was fully equipped in this way. Several thousand mattresses and pillows made of palmetto were purchased in Jacksonville. The mattresses proved very serviceable for the typhoid cases as, owing to their trifling cost, they could be disposed of by burning when they became infected. A medical supply depot was afterwards established at Savannah, Ga., and again at Quemados, Cuba, for the supply of the Seventh Corps, so that in no instance were medical officers inconvenienced for the want of anything in caring for the sick of this army corps.

The wards of the division hospitals were tent pavilions disposed as radii of a semicircle. Each hospital comprised six wards, and each ward consisted of four to eight ward sections, according to the need for accommodation. Ward sections consisted of two hospital tents separated from the adjoining section by the space of one tent. All the tents and spaces between ward sections were floored, the tents framed and side railed, and many were inclosed in wire mosquito bars. Ordinarily each tent contained five cots, although on several occasions it became necessary to place six in each. All the hospitals were provided with mess and diet kitchens, storerooms, bathrooms, ice house, and disinfecting plants. They were also provided with well equipped operating tents in connection with the surgical wards.

Early in September five pavilion wards were erected at each of the hospitals. Each pavilion was divided into two wards by a central room intended for medicines and the service of the wards. Each ward had a capacity of twenty beds. The buildings were constructed of rough pine lumber, covered with tarred paper and elevated two feet above the surface of the ground.

A general operating hospital was organized for the corps at Savannah, Ga., and placed under charge of Maj. George R. Fowler, United States Volunteers. This had a capacity of twenty beds. It served also as an emergency hospital for the provost guard stationed in the city.

In addition to these provisions for the treatment of the sick of the corps, a convalescent hospital was established at Pablo Beach. Many men of the First Division, on its arrival from Miami, were sent to this hospital for recuperation. An unfurnished two-story hotel, with a capacity of 350 beds, was utilized for this purpose. The accommodations at this beach were afterwards extended by a canvas convalescent camp. It was closed about the middle of November, after having served latterly as a brigade hospital for certain regiments in the neighborhood.

About October 1, the reestablishment of regimental hospitals in the corps was begun in accordance with the requirements of General Orders 151, Adjutant-General's Office, War Department. The command at the time was preparing to move to Savannah, Ga., from its camp at Jacksonville, Fla., so that it was not possible to have these hospitals fully equipped before the move was made. Some regimental surgeons, however, had succeeded in obtaining hospital tents, and a few had as many as fifty sick men under treatment in them. When the movement was effected these men had to be transferred to the division hospitals; and this fact alone, as remarked by the corps surgeon, demonstrated the incapacity of the regimental system to care for the sick of the regiments under unusual conditions or when moves were contemplated from time to time.

The Seventh Corps was moved from Savannah, Ga., to the Division of Cuba during the latter part of December, 1898, and the first week of January, 1899. Many interesting details concerning the medical history of this corps are given in a report rendered by its chief surgeon.

REPORT OF LIEUT. COL. LOUIS M. MAUS, CHIEF SURGEON, SEVENTH ARMY CORPS.

FORT HAMILTON, NEW YORK HARBOR,
July 1, 1899.

SURGEON-GENERAL UNITED STATES ARMY,
Washington, D. C.

GENERAL: I have the honor to submit herewith my report as chief surgeon, Seventh Army Corps, from date of assignment until my return to the United States, the latter part of February past, a few weeks before its disbandment. In obedience to Special Orders, No. 116, Headquarters of the Army, Adjutant-General's Office, dated May 18, 1898, I proceeded to Tampa, Fla., and reported as chief surgeon to Maj. Gen. Fitzhugh Lee, United States Volunteers, commanding.

Composition and organization.—The organization of this corps began by the assignment of the following volunteer regiments of infantry, which had already assembled at Tampa, Fla., and were designated as the First Division, commanded by Brig. Gen. Guy V. Henry, United States Volunteers: Third Ohio Infantry, Fifth Ohio Infantry, Second Georgia Infantry, Thirty-second Michigan Infantry, First Florida Infantry.

The Second Division, which at this time was located at Jacksonville, Fla., consisted of the following regiments, under the command of Brig. Gen. A. K. Arnold, United States Volunteers: Second Illinois Infantry, First North Carolina Infantry, Fiftieth Iowa Infantry, First Wisconsin Infantry.

The headquarters of the corps were transferred to Jacksonville, Fla., on the 31st of May, through telegraphic instructions from Washington, and remained in that city until the 23d of October, when they were transfered to Savannah, Ga. The First Division, which had remained at Tampa, was transferred back to the Fourth Army Corps, and the First Division of the Fourth Corps, then at Miami, was assigned to the Seventh Corps in place. This division consisted of the following regiments, under the command of Brig. Gen. Theodore Schwan, United States Volunteers: First Texas Infantry, Second Texas Infantry, First Louisiana Infantry, Second Louisiana Infantry, First Alabama Infantry, Second Alabama Infantry.

This division was organized at Mobile, Ala., and originally belonged to the Fourth Army Corps. On June 20 it was transferred to Miami, Fla., where it remained until July 31, when, on account of the great prevalence of fever and intestinal troubles, it was ordered to Jacksonville, Fla.

The organization of the Second Division was completed by the 14th of June, by other regiments, which joined in Jacksonville, as follows: Second Virginia Infantry, June 3; Second New Jersey Infantry, June 4; Fourth Illinois Infantry, June 5; Fourth Virginia Infantry, June 6; Forty-ninth Iowa Infantry, June 14.

The Fourth Illinois Infantry was transferred to the Third Division on the 5th of August, and the Ninth Illinois Infantry, which arrived on August 9, was assigned to the Second Division, to take the place of the Fourth.

The organization of the Third Division began by the assignment on June 21 of the Second Mississippi Infantry, which arrived at Jacksonville on that date, and was placed under the command of Maj. Gen. J. Warren Keifer, United States Volunteers. The following regiments were assigned to this division: Second Mississippi Infantry, June 21; Second United States Cavalry, June 28; Third Nebraska Infantry, July 22; First South Carolina Infantry, July 31; Fourth Illinois Infantry, August 5; One hundred and sixty-first Indiana Infantry, August 14; Sixth Missouri Infantry, August 15.

In addition to the 22 regiments belonging to the three divisions, the following organizations belonged to the corps on the 31st of August: Three hospital companies, 4 ambulance companies, 1 detachment of United States Signal Corps, 2 volunteer signal companies.

The maximum strength of the corps on this date consisted of 1,252 officers and 30,119 enlisted men, with a grand total of 31,371.

Organization of the medical department.—The organization of the medical department was outlined in a circular letter sent to the chief surgeon of each corps, from the office of the Surgeon-General, which had received the sanction of the Major-General Commanding. The provisions of this letter were embodied in a communication to the Adjutant-General of the Seventh Army Corps shortly after my arrival in Jacksonville, and were published in General Orders, No. 4, Corps Headquarters, dated June 4, 1898. The distribution of the personnel of the medical department was as follows:

Corps and division hospitals: Six medical officers, 6 hospital stewards, 2 acting stewards, 90 privates.

Ambulance companies: Three medical officers, 7 hospital stewards, 3 acting stewards, 104 privates.

Regiments of cavalry: Two medical officers, 1 hospital steward, 2 privates.

Battalion of artillery: One medical officer, 3 acting hospital stewards, 1 private.

Regiment of infantry: One medical officer, 1 hospital steward, 1 private.

It was presumed that the medical officers and hospital stewards, acting hospital stewards, and privates necessary for the personnel of corps and division hospitals, and ambulance companies, were to be taken from the regiments serving in the corps, it being understood that regimental hospitals were to be abolished. In addition to the distribution of the personnel, the following provisions were embodied in General Orders, No. 4:

"The hospital and ambulance company privates for the Seventh Army Corps will, as far as possible, be transferred from the regiments and battalions serving in it. The surgeon of each regiment, with the approval of the regimental commander, will designate 26 privates for this purpose. All hospital tents, litters, bunks, and other medical and hospital property belonging to the United States, in the possession of the different regiments, will be turned into the division hospitals. Regimental hospitals will be abolished for the present, and all cases requiring medical or surgical treatment sent to the division hospital, except those that can be properly treated in quarters. An ambulance will report daily, after surgeon's call at each regiment, to remove to the division hospital all cases designated by the regimental surgeon for hospital treatment. Men who become injured or taken ill after surgeon's call, requiring hospital treatment, will be reported to the officer in command of the division ambulance company, who will have them removed as soon as possible. Medical officers assigned to duty with each regiment will attend surgeon's call, and those men undergoing treatment in quarters, render emergency aid when needed, prescribe for those not on sick report, requiring medicines for slight ailments, and look after the sanitary condition of the regiment.

"Medical officers serving with regiments will be furnished pocketcases, first-aid packages, bandages, tourniquets, and all medical supplies needed for the thorough performance of their duties; also one orderly and one hospital-corps pouch. All assignments of medical officers, hospital stewards, acting hospital stewards, and privates detailed for duty with the corps and division hospitals, litter bearer and ambulance companies and regiments will be made by the chief surgeon of the corps. Departures from the assignment of medical officers and members of the hospital corps, as set forth above, will be temporarily made by the chief surgeon from time to time to meet the exigencies of the camp or battlefield."

The organization of the medical department of the volunteer regiments was very incomplete and unsatisfactory, bringing with them the organization employed in the State service. As a rule, each regiment was provided with 1 surgeon with the rank of major, and two assistant surgeons ranking as captain or first lieutenant. The rank of the assistant surgeons of the various States represented was not uniform. The Second New Jersey Infantry was provided with 1 surgeon and 3 assistant surgeons, 1 for each battalion, which proved to be a very satisfactory arrangement, 3 regimental surgeons being insufficient with the regimental hospital, which was established later. Each regiment was provided with 3 hospital stewards, but no hospital privates, except in a few instances, where men had been detailed as hospital attendants from the regiments. It was the exception to find any of the hospital attendants qualified for nursing and first-aid assistance. None knew anything about litter drill, or the various methods of carrying the wounded. The Hospital Corps of the Regular Army at the declaration of war was scarcely sufficient for the needs of an army of 25,000 men, during peace, and living under the most advantageous circumstances. It consisted of about 100 hospital stewards, 100 acting hospital stewards, and 600 privates. After the first call for 125,000 volunteers had passed Congress, and was signed by the President, it was found that no provision had been made for a hospital corps service for this additional army. This difficulty was overcome by the issue of General Orders, No. 58, Adjutant-General's Office, 1898, allowing the transfer of men from the volunteer regiments to the Hospital Corps of the Regular Army. The questions involved in the transfer of the volunteers, who had enlisted for two years, to the Regular Army, where the period lasted three years, was satisfactorily decided by the Attorney-General, and the legality of the transfer, as far as I know, was never questioned by any soldier transferred.

Organization of ambulance companies.—The following order relative to the organization of ambulance companies, was issued June 9, shortly after the headquarters of the corps arrived in Jacksonville, which was in accordance with plans submitted from Washington:

"4. Upon the recommendation of the chief surgeon, the following regulations concerning the organization of the hospital corps are published for the information of all concerned. The personnel of each division ambulance company of this corps will consist of 3 medical officers, 7 hospital stewards, 3 acting hospital stewards, 104 privates, and will be under the command of the ranking medical officer assigned to duty with it, who will be held responsible for its discipline, instruction, and management. He will make requisitions on the chief surgeon of the corps for the necessary pouches, drill regulations, and blanks. He will also submit requisitions for the necessary litters, camp equipments, and ordnance supplies without delay to the chief quartermaster and ordnance officer of the division. Rations for the division ambulance companies will be drawn as ordered for line organizations.

"The division ambulance companies will be given daily instructions in marching, litter drill, loading and unloading litter, improvisation of litters, method of removing wounded without litters, placing patients on horseback, the use of the travois, two-horse litters, the preparation and use of ordinary wagons and other vehicles for the transportation of the sick and wounded, ambulance drill, inspection and muster of the detachment, tent drill, packing, packing hospital orderly pouches, and the clothing roll. Regular daily instruction will be given in first-aid to the wounded, and medical emergencies. Directions as to the scope of first-aid and medical emergency instructions will be submitted by the chief surgeon of the corps.

"The drill regulations for the Hospital Corps, United States Army, 1896, will be used for the above drill instructions."

The three division ambulance companies were organized during the early summer, and were thoroughly equipped by the time the divisions were formed. Later a reserve ambulance company was organized under the command of First Lieut. J. S. Wilson, assistant surgeon, United States Army.

A suitable camping ground was selected for each ambulance company conveniently located with regard to the division hospital, though independent of the latter in every particular. As a rule, each company was provided with 12 ambulances, 14 escort wagons, 104 mules, and 22 horses. A blacksmith was employed and forge erected for the use of each company. Before the organization of regimental hospitals under General Orders, No. 151, Adjutant-General's Office, 1898, the commanding officers of ambulance companies were directed to send an ambulance to each regiment at sick call daily, in order to convey the sick immediately afterwards to division hospitals. Three ambulances were also required to be kept in readiness for emergency calls during the day and night. This system worked admirably and gave general satisfaction. After it became evident that a contraction of the corps was imminent, by reason of the muster out of many of the regiments, the following official application was made September 30, 1898, to the corps commander to disband these companies and attach the personnel to division hospitals. Hospital attendants were badly needed at this time, and it seemed impossible to secure them otherwise.

"I have the honor to recommend that the first, second, and third division ambulance companies of this corps be disbanded from this date, and that the stewards, acting stewards, and privates of these companies be assigned to the hospitals of the divisions with which they are serving, and that the quartermasters of these ambulance companies be authorized to turn over to each regiment of their division one complete ambulance and team and four ambulances and teams complete to the division hospital. I would also recommend that the quartermasters of these companies be authorized to turn back to the Quartermaster's Department, Ordnance Department, and Medical Department all properties in their possession pertaining to these different departments, and that the acting quartermasters be returned to their regiments for duty after the transfer of this property."

The reserve ambulance company had been disbanded a few days previously, the necessity for its existence being no longer apparent. The disbanding of all of the ambulance companies was completed by the 10th of October and the ambulances distributed to regiments and division hospitals. This arrangement proved fairly satisfactory, but did not equal the service during the existence of the ambulance companies. All of these companies were commanded by assistant surgeons with the rank of first lieutenants. It appeared to me that the commanding officer of each company should have the rank and pay of a captain of cavalry, and a letter was written to the chief surgeon, army in the field, to this effect July 3. There can be no doubt but that the duties and responsibilities of the ambulance company commanders are in every way equal to those of a troop commander. In addition to the personnel of each ambulance company as provided for in General Orders, No. 6, headquarters of the Seventh Army Corps, a lieutenant from the line was attached to each company to perform the duties of quartermaster and commissary.

Ambulances and their misuse.—Four different patterns of ambulances were issued to the ambulance companies. The Leavenworth ambulance, Studebaker, Toledo, and the old pattern Red Cross, which was employed shortly after the war of the rebellion. In my opinion the ambulance manufactured by the Toledo Wagon Company was superior to the others: it has a carrying capacity of four patients in the recumbent position, ten or twelve sitting up, and can be turned in a short space. The principal objection to the Studebaker ambulance lies in the fact that it is difficult to turn in a narrow road or street, as it does not cut under. The Leavenworth ambulance is an excellent wagon for the sick, but only has a capacity for two in the recumbent position. The old Red Cross ambulance has many objectionable features, and may be regarded as obsolete.

Paragraph 1415, Army Regulations 1895, was quite frequently violated by both line and medical officers. These vehicles were used as carryalls or pleasure wagons by officers, women, and children in going to the city and returning to camp. Especially did the misuse of ambulances occur after they were transferred to regiments as part of the equipments of regimental hospitals. The colonels of regiments apparently considered that they were issued for general use. Their use was also attempted by the provost-marshal as a hackabout for transporting the guard and drunken soldiers to and fro. The attention of the corps commander was called to this abuse on several occasions, but in spite of very stringent orders it was almost impossible to enforce them. It is probable that this violation of regulations would not have occurred had the officers been better disciplined. The following, dated August 16, 1898, was one of several letters submitted by me to the adjutant-general of the corps upon this subject:

"I have the honor to state that there has been great abuse of the hospital ambulances in this corps by reason of their misuse for other than official purposes. In many instances these ambulances are overloaded and used as pleasure wagons, carrying women, children, and other unauthorized persons to the city and back from the various camps. I therefore respectfully recommend that an order be issued from corps headquarters limiting the use of all hospital ambulances to Paragraph 1415, Army Regulations, and that all persons using them for other than official purposes, as contemplated by Army Regulations, be court-martialed, and that the provost guard be authorized to arrest and hold up all ambulances used except for official business."

Medical officers.—The medical officers serving with the Seventh Army Corps were drawn from civil life with the exception of a very few from the Medical Corps of the Army, and consisted of the following classes: (1) Army medical officers; (2) volunteer staff surgeons; (3) volunteer regimental surgeons; and (4) contract surgeons.

Chief surgeons of division and brigade surgeons.—From the organization of the corps in the early summer until its reorganization about the 1st of November these positions were filled by Presidential civil appointments. Many of these gentlemen were prominent at home as physicians and surgeons, but had practically no knowledge or experience in the administrative and clerical duties they were expected to perform. They were willing to learn their duties, and indeed a few of them did acquire more or less knowledge of official work during the campaign, not sufficient, however, to be of any material assistance to the chief surgeon of the corps. The many instances of poor camp sanitation and lack of proper administrative work which could be cited under their direct supervision attest the inefficiency of such a system of appointment and the necessity for a further expansion of the Regular Army Medical Corps, which should be kept constantly on a war footing for an army of at least 80,000 men. Competent physicians can be employed at any time from civil life; not so with the trained military surgeon. whose usefulness comes only with years of service and special training. In a private communication from one of these officers since being mustered out of the service occurs the following statement:

"I fully realize that I was unable to render you the assistance that you had the right to expect from a chief surgeon of division."

The services of several of the division and brigade surgeons were utilized in operating hospitals, where they performed many difficult operations and some very conspicuous work. Among those officers were Majs. Eduard Boekmann, George R. Fowler, and J. R. McDill. Maj. James E. Pilcher was detailed as medical-supply officer early in June, and performed his duties with extraordinary ability. which remark equally applies to Majs. J. R. Kean and Paul Clendenin, both of whom were detailed as medical inspectors of divisions and commanding officers of division hospitals.

Regimental surgeons.—The majority of the regimental surgeons mustered into the volunteer service were entirely inexperienced in the duties of a military surgeon, and few were even required to pass a professional examination. A large percentage of the national guard medical officers failed to offer their services when their regiments were mustered into service and new men were required to take their places. The commission, however, given to the volunteer surgeon did not affect that of the national guardsman, and the anomalous condition of two surgeons for one regiment, in some instances, actually existed during the war. This in part accounts for the large number of volunteer surgeons who had enjoyed no previous military experience. None of them had any knowledge whatever of administrative duties. and, in fact, when reporting for duty with the corps were unable to properly conduct sick call or make out their morning sick report. I feel quite sure that the medical service suffered more on the score of inexperience on the part of regimental surgeons than from any other cause. They apparently failed to appreciate the great necessity for camp sanitation. though instruction had been given them, and they were abundantly supplied with letters. circulars. etc., on the subject. Their official reports were scarcely ever received in time or in proper form, and the monthly report of sick and wounded was frequently detained for months, or when forwarded had to be returned numberless times for correction. Very little administrative or clerical work is required of the medical officer in the national guard. This in part accounts for the lack of training observed among men in this regard.

Contract surgeons.—Owing to the great increase of sickness during the midsummer months, it became necessary to employ a large number of physicians from civil life. These officers were principally utilized at division hospitals. where they were placed in charge of wards. or assigned to regiments. to take the place of regimental surgeons who were sick or had gone home on leaves of absence. The majority of these men were young. and not a few came directly from large hospitals. As a rule they performed their duties ably and in a conscientious manner. During the summer. before General Orders. No. 127. 1898. was issued. they were permitted to wear an assistant surgeon's uniform with the corps device and army insignia. but without rank. Quite a number of the contract surgeons contracted typhoid while on duty and remained ill for intervals of one or two months. During their sickness they were deprived of all pay on account of a decision from the office of the Comptroller of Treasury. the injustice of which must be apparent to all. In my opinion these officers are as fully entitled to any consideration resulting from war service, as the commissioned medical officers of volunteers.

Hospital stewards and acting hospital stewards.—The organization of volunteer regiments provided three hospital stewards, one for each battalion; none of these regiments were provided with acting hospital stewards or hospital privates. The acting stewards were selected from the men transferred from the regiments, and during the early days of the corps organization were required to undergo an examination for the position. The subjects inquired into included arithmetic, materia medica, pharmacy, care of the sick, minor surgery, first aid, and camp hygiene. Owing to the rapid expansion of the medical service, it became impossible to supply the needs of the department with acting stewards who were professionally qualified. Numbers of noncommissioned officers were required for the various positions of responsibility, such as charge of mess rooms, kitchens, storehouse, bath house, corral, laundry, general police, office work, etc., besides those positions requiring technical knowledge, such as the dispensary work and charge of wards. Privates of known ability and good character were detailed as acting hospital stewards for these positions without examination. Very few Regular Army hospital stewards were ever sent to the corps. Only ten hospital stewards of the Army were allowed to each corps, and most of these men were appointed from hospital privates who had seen previous service. Few of the volunteer hospital stewards knew anything of the necessary clerical work, the most of them having come directly from civil life, without previous military training, even in the national guard. Under these circumstances the inability to submit reports by the regimental surgeons was not a matter of much surprise. Hospital Stewards Wolf Aisenman and George Gibbens were the only two full stewards assigned to the corps. Westman and Hastings were appointed from regular Hospital Corps privates and assigned later. All of these men performed excellent service. Steward Aisenman had charge of the clerical force in my office, and deserves great credit for his untiring industry and zeal and his knowledge of official reports. The proper performance of his duties required about eighteen hours daily, which he time devoted to his work cheerfully and without complaint.

Hospital privates and their transfer from volunteer regiments.—Pursuant to General Orders No. 58, Adjutant-General's Office, 1898, about 650 men were transferred to the Hospital Corps of the Army from regiments attached to the Seventh Army Corps. In addition to this number about 150 were enlisted in Jacksonville or elsewhere, and as many more joined from the North, having been ordered to the corps through the Surgeon General of the Army.

Preliminary to the transfer of these men, I wrote a letter to each regimental surgeon on the strength of General Orders No. 58, requesting that especial pains be taken in selecting men for the Hospital Corps. At the outset it seemed almost impossible to secure the transfer of these men on account of objections advanced, not only by the company commanders, but by the men themselves. The company commanders objected to the depletion of their companies, while the men objected on account of the extra year of enlistment, besides they did not wish to leave their comrades. These difficulties were overcome by judicious argument, explanation, and promises. The men were assured that they would not be ordered away from the division in which their regiment was serving, and promised discharges as soon as the war was over and their regiments were mustered out. An order to this effect was issued by the War Department later. A large number of the men transferred were physicians, druggists, dentists, and men who had been employed in hospitals. In spite of the care and selection, quite a proportion of them were men whom the company commanders were glad to get rid of, and who afterwards proved to be of very little service in hospital work. In addition to the 26 originally transferred from each regiment, a number of special transfers were made from time to time, and in a few instances several of the regiments in the corps furnished as many as 40 men. Several of the regiments joining the corps later in the season came with no Hospital Corps men. The surgeons of these regiments informed me that a number of men had been transferred to the Hospital Corps elsewhere, and it became impossible to secure any more from these regiments. Several of the regiments belonging to the corps furnished no transfers, the colonels and regimental officers objecting to the loss of their men. An attempt was made to secure additional men from the regiments about to be mustered out of the service during the fall, but with little success. A circular was sent to these regiments, but the colonels and regimental officers objected to the loss of their men for the reason that they did not wish to return to their States with depleted regiments and small companies.

Trained nurses.—About the 1st of August there was a great increase of typhoid fever among the troops, and it was regarded as best for the interest of the sick to employ trained nurses in division hospitals. About this time the public press was unnecessarily alarming the people of the country about the lack of care the sick soldiers were receiving, especially with regard to nursing. Many of the men who were transferred from the volunteer regiments to the Hospital Corps performed excellent service as nurses and were very faithful. Unfortunately there was not enough of this class to attend to the enormous number of typhoid cases, which suddenly developed in some of the regiments. In the Second Division hospital at one time over 400 cases were under treatment. Of course, many of them were mild or medium in character, though a large number of serious cases were also under treatment requiring almost constant care. It was impossible to secure the services of a sufficient number of trained male nurses. About 150 female nurses were employed in the various hospitals of the Seventh Army Corps, many of whom performed excellent service. Probably 25 per cent were nongraduates, but had more or less previous experience with the sick. A number of this class were advantageously employed in the diet kitchens and as matrons. Considerable difficulty was experienced in caring for the female nurses in the field: since they were unable to undergo the hardships of camp life, many of them became ill or contracted fevers, and hence became a burden to the hospital where they were on duty. While it became necessary to employ female nurses during the war, the system worked greatly to the disadvantage of the Hospital Corps man. The following has been taken from a report I made to the Surgeon-General on this subject:

"Should we expect to restore the Hospital Corps to that grade of efficiency that existed previous to the Spanish-American war, the employment of female nurses must be discontinued. As a result of the present state of affairs, the hospital private takes no interest in his duties as a nurse, nor can he be expected to so long as he is brought into contact with the female nurse. There is a decided tendency on the part of the latter to ignore entirely the Hospital Corps man's ability to care for his sick comrades and to put him aside, except for the menial duties of the ward. Divested of any responsibilities in the way of taking temperatures, attending the serious cases, administering medicines, dressing wounds, etc., the private soon becomes a willing party to the arrangement, and hence his utter worthlessness as a nurse in the course of a very short time. It is practically impossible to divide the ward work equally between nurses so radically different in class. I also find it difficult to preserve as good military discipline with this mixed personnel. The 'coddling process,' which is characteristic of the female nurse in caring for male patients, has become more accentuated in her treatment of the sick soldiers through some maudlin sentiment. As a consequence, I find that many men apply for treatment who under normal conditions would never think of going to the hospital. Venereal diseases are not uncommon among our soldiers, especially the recruit of to-day. It is not always convenient to assign such patients to wards designated especially for this class of disease. The presence of the female nurse leads under these circumstances to considerable embarrassment on the part of those present and very much extra trouble in taking such cases out of the ward for treatment or surrounding them with screens. The extra arrangements necessary for messing and housing female nurses also adds to the cares of the hospital administration. There are very many other excellent reasons why civilians should not be employed in military hospitals apart from those mentioned above.

"In conclusion, I believe, as a rule, that the female nurse should never be employed in military hospitals, except under conditions such as existed during the Spanish-American war, when an enormous army was placed in the field and overwhelmed with sickness, there being at the time scarcely sufficient trained Hospital Corps men in service to attend to the needs of one army corps."

Organization of hospital companies for division hospitals.—A very considerable difficulty was experienced by commanding officers of division hospitals in regard to the daily status of the personnel of the hospital corps. It seemed almost impossible, with a detachment numbering from 150 to 350 men, to locate every man connected with the hospital correctly. While a daily morning report was submitted to division and corps headquarters, I learned that frequently from 10 to 50 privates or acting stewards were absent without either the knowledge or permission of the surgeon in command. This was a common occurrence at the Second Division hospital, where at one time more than 350 privates were on duty. This state of affairs is not to be wondered at, when we consider that the majority of these men were undisciplined and raw recruits, and that this large body of men was officially regarded as a detachment. For purposes of a better discipline, and also with a view to a more definite assignment of each private, I concluded to divide the detachment into companies on the plan of line companies, approximating them as far as possible in organization. Owing to the limited number of commissioned officers on duty at each hospital, it was impossible to detail one captain and two first-lieutenant medical officers to each company. A letter of recommendation in regard to this new departure was written to the corps commander, and resulted in the promulgation of General Orders No. 67, headquarters of the corps, as follows:

"The personnel of the hospital corps serving at division hospitals will be organized into companies and designated as Hospital Companies A, B, C, etc. Each company shall consist of 3 hospital stewards, 6 acting hospital stewards, and 60 privates, and shall be commanded by a commissioned medical officer, who will be required to make out a daily report of his company to the commanding officer of the hospital and to keep the usual company books pertaining to company organizations. The ranking hospital steward of each company shall perform the duty of first sergeant, and in case of his absence this duty shall devolve upon the next hospital steward or acting hospital steward present, according to rank.

"The hospital stewards and acting hospital stewards, in addition to their company duties, will be available for detail in dispensaries, in charge of storerooms, mess rooms, kitchens, and will perform clerical work or any other duty the commanding officer of the hospital may find necessary. Privates and acting hospital stewards will be detailed as ward masters, nurses in wards, or in charge of storerooms, mess rooms, kitchens, receiving tents, and will perform clerical work or such other duty as the commanding officer of the hospital may see fit to designate."

In order to facilitate the organization, the following letter was written November 26, 1898, to surgeons commanding division hospitals:

"The hospital corps at division hospitals will be organized into four companies, namely, Companies A, B, C, and D, and the personnel of the hospital corps will be divided equally among these four companies. It is my desire that there shall be at least one first lieutenant and assistant surgeon, one hospital steward, and four acting stewards assigned to each company. The usual roll calls, as prescribed by companies of the line, should be followed and rigidly adhered to, roll call to be held at least twice a day in the presence of one medical officer, who shall be detailed as officer of the day, the hospital steward acting in the capacity of first sergeant of each company. In case that the hospital steward assigned to companies is absent, then the duty of that office shall devolve upon the ranking acting hospital steward in the company. All absentees should be reported at once to the commanding officer of the hospital, and unless proper authority has been obtained for this absence, charges should be preferred against each man for this military offense.

"I also desire that each company of hospital corps men, as far as possible, shall be given daily instruction in the hospital-litter drill and instructions in first aid. This can, in my opinion, be carried out now, owing to the small amount of sickness in each division hospital, and especially as the nursing is being done principally by the female trained nurses.

"The chief surgeon of each division will be instructed to see that these orders are rigidly enforced, and that a weekly report will be made to the chief surgeon of the corps as to the number of litter drills given during the week.

"Privates of the hospital corps will be detailed as nurses in wards; on clerical duty in the various offices connected with the hospital; in the storerooms, kitchens, receiving tents, and on police duty in accordance with the necessity of the case. A daily roster will be kept of these privates showing their duties for the day. The hospital stewards will be employed, in addition to their duties as first sergeants of companies, in the various offices connected with the hospitals, in charge of storerooms, mess rooms, kitchens, etc., as the surgeon in command sees fit. Acting hospital stewards will be detailed in offices, if necessary, dispensaries, and as ward masters, and such other duty as the surgeon in command may see necessary."

The organization was carried into effect very promptly at the two remaining division hospitals, and proved very satisfactory. The effect of simplifying the work of hospital detail was marked, as well as an improvement in the discipline of the men. I greatly regret that this organization had not been put into force earlier in the summer.

Medical and official reports.—Great difficulty was experienced during the first few months in securing the customary daily, weekly, and monthly reports pertaining to the Medical Department. All of the medical officers of the corps, with the exception of three belonging to the Regular Army, were volunteers and had little or no previous training in army medical administration or clerical work. The same remark applied equally well to the hospital stewards and other members of the hospital corps, all of whom, with a few exceptions, were taken from the volunteer regiments. A proper preparation of the monthly report of sick and wounded appeared almost impossible to many of these officers. It is true that considerable experience is required in properly making out this report, which embodies very many details; besides, as a rule, they were very voluminous, the report from each regiment containing from two to three hundred cases, while those from division hospitals frequently went into the thousands. Instruction was repeatedly given medical officers in regard to their administrative duties, especially with reference to the preparation of reports. Besides instruction given collectively to them in the way of lectures, Majors Kean and Clendenin, brigade surgeons, who were detailed as medical inspectors, visited the regimental and division surgeons daily for this purpose.

In spite of these instructions, in some instances months passed before the monthly report of sick and wounded could be obtained from certain regimental surgeons, and, after being returned from time to time for correction, it often became necessary to have a fresh copy made for the Surgeon-General's office, the original copy having become too greatly defaced or soiled in going backward and forward for correction. Tardiness and delay in submitting the report of sick and wounded was a common characteristic of medical officers during the first six months of the corps' existence, though I believe a complete sick record of every regiment and organization belonging to the corps was finally obtained. The data from which these reports were made up during the first few months showed remarkable discrepancies between certain regiments, though of equal length in the service. During the month of May one regiment reported 152 cases, while other regiments in the same division, with practically equal service, reported very few. This resulted from a lack of proper data and from irregular and slipshod methods of attending sick call. Generally speaking, few of the volunteer surgeons had any practical knowledge of conducting sick call or of making out the daily morning sick report required by regulations. In fact, the regimental adjutants, as a rule, never required such a report in the National Guard, the consolidated morning report of the regiment being generally made up from the company books. Hence great discrepancies frequently occurred between the surgeon's and adjutant's reports in regard to the regimental sick.

During a tour of inspection to the First Division, at Miami, as late as July 12, very few of the regimental surgeons were making out the daily morning sick report or keeping a register of sick and wounded. One medical officer on duty there informed me that he had furnished a daily morning report until June 16, but after that date had discontinued it; for what reason he did not state. Under such circumstances, it can readily be imagined that some difficulty must have been experienced by the medical officers of this division in furnishing proper and correct reports of sick and wounded for the preceding months. I desire to add that this division had but recently joined the Seventh Army Corps at date of my visit. The ordinary blanks used by medical officers were kept in the chief surgeon's office, and issued directly to them on their personal application. In addition to the regulation reports and papers required in the administration of the Medical Department and hospital corps, I found it necessary to devise and furnished the following additional blanks:

1. Regimental transfer slips for men sent to division hospitals. (Green.)
2. Division hospital return slips for men sent back to regiments. (Red.)
3. Regimental daily report of sick to brigade surgeons.
4. Brigade surgeons' daily report of sick to division surgeons.
5. Division surgeons' daily report of sick to corps surgeon.
6. Corps surgeon's daily consolidated report of sick and wounded to the corps commander.
7. Weekly sanitary report.
8. Daily morning report of medical officers, hospital stewards, acting hospital stewards, privates, and nurses to corps commander.

Medical supply depot.—The day following my arrival in Jacksonville I designated Maj. James E. Pilcher, brigade surgeon, medical supply officer, and sent him to Tampa for supplies of all kinds, including hospital furniture, medicines, medical and surgical chests, litters; hospital, wall, and common tents; ambulances, wagons, horses, mules, clothing, ordnance equipment, and in fact everything necessary to organize division hospitals and ambulance companies. The Surgeon-General informed me on my departure from Washington, a few days before, that I was to make requisitions on the depots in that city for my supplies. I learned a few days later from Major Pilcher that the commanding general of the Fifth Corps refused to allow any supplies whatever to leave Tampa until his corps, which was momentarily expecting to go to Cuba, was equipped. The delay in securing these supplies at this time necessitated the purchase of cots, bedding, cooking stoves, utensils, and medical supplies in Jacksonville for the Second Division Hospital, which was then organizing. On the 12th of the month I was ordered to Tampa on a retiring board, and then, through General Miles's generosity, who was there at the time, secured a train load of supplies, such as hospital tents, wall and common tents, medical and hospital supplies, medical and surgical chests, litters, quartermaster supplies, 12 ambulances, 14 escort wagons, 12 horses, and 104 mules, and was thus enabled on my return to Jacksonville to completely organize and equip the Second Division Hospital and ambulance company. All subsequent medical and hospital supplies were obtained from New York City, St. Louis, or Washington through telegraphic requisitions on the Surgeon-General of the Army, or by purchases in Jacksonville, Savannah, or Havana on his authority.

From about the 15th of June medical and hospital supplies were abundantly and promptly supplied the corps, and as a rule by express. Not infrequently, in less than two hours after sending in a telegraphic request for supplies a reply would be received stating that the articles asked for had been ordered and would leave that same day by express. The bulk of supplies came from the depot in New York City, in charge of Lieut. Col. J. M. Brown, to whom great credit is due for promptness in shipping and excellent judgment displayed in quality of supplies sent. A large building, conveniently located with regard to the troops, railroad depots, and wharf, was rented in the city of Jacksonville for the depot. Major Pilcher was provided with one medical officer as assistant, one hospital steward, two acting stewards, and four privates. Quite a large personnel was necessary, not only for the clerical work, which was quite large, but for issuing and handling the supplies. In addition to the medical and hospital stores, the supply officer made requisitions for clothing, ordnance, and horse equipments for the entire hospital corps, which was fully equipped in this way. Major Pilcher was very energetic in the performance of his duties, and worked very hard to maintain a well-supplied depot. He was instructed to fill requisitions as they came in from regiments and hospitals, even if it were necessary to purchase articles not on hand in open market. At a time when the policy of every newspaper in the country appeared to be one of criticism toward the Government, it was deemed best to be very liberal in regard to the issue of medical supplies. This policy of liberality was even carried to the point of purchasing proprietary, and in a few instances patent, medicines to satisfy the whims or caprices of a few regimental surgeons, who otherwise would have considered themselves badly treated.

Jacksonville and Savannah proved to be excellent points for the purchase of such supplies as were needed for the hospitals, and I believe a large sum of money was saved the Government in certain expenditures made there. Several thousand mattresses and pillows made of palmetto were manufactured and purchased in Jacksonville, at a very low cost. The price of these mattresses ranged from 65 to 75 cents and the pillows about 15 cents. The mattresses proved very serviceable for the typhoid cases, and owing to the trifling cost, the Government was able to burn them when they became infected. The supplies received, as a rule, were of an excellent quality and gave general satisfaction. A circular was issued to medical officers in charge of regiments and hospitals, designating the day of the week upon which supplies could be drawn. Medical officers were required to forward requisitions to chief surgeons of divisions one day in advance for approval. The medical-supply officer was also instructed to inform the chief surgeon of the corps of any instance in which organizations were drawing too heavily on the depot. Very frequently very poor judgment was displayed by medical officers in making out requisitions, and as a rule quantities far in excess of the actual needs were asked for. The issues were made weekly, and distributed either by means of escort wagons attached to the medical department of the various organizations or by ambulances. A medical officer or hospital steward was required to be present and receipt for the supplies on leaving the depot. A medical-supply depot was also established in Savannah, Ga., and one in Quemados, Cuba, for the Seventh Army Corps. I believe it can be safely said that at no time after the establishment of the medical-supply depot did a single instance occur when medical officers were inconvenienced for the want of anything in caring for the sick of the Seventh Army Corps.

In my opinion a supply depot should be incorporated in the organization of the Medical Department for every corps or division. It is believed that when a command is reduced to the size of a brigade, the regiments serving in it can then be supplied from the brigade hospital provided they are serving together. I do not believe it possible to require all of the organizations of a division to draw their supplies from a division hospital, for the reason that the work connected with a supply depot of this size requires more attention than can be given it by the surgeon in command of the hospital. It is possible to have the depot established near or on the grounds of the division hospital, but it should be run independently of it. A few days before the Seventh Army Corps sailed for Cuba, Major Pilcher received an order from Washington, detaching him from it and establishing a general supply depot in Savannah. I regretted to lose the services of an officer who had contributed so much to the successful administration of the Medical Department during the long, tedious summer while the corps was in camp at Jacksonville.

American National Red Cross Association and other Relief Societies.—A letter was received from the Surgeon-General of the Army, June 10, stating that the Secretary of War had approved of a proposition made by the American National Red Cross Association for supplying the volunteer camps with "any desired amount of hospital supplies, ice, malted milk, condensed milk, Mellin's food, etc.," and directed the cooperation of chief surgeons of army corps and divisions.

At my request a representative of the Red Cross Society was sent to join the Seventh Army Corps at Jacksonville, Fla. The Rev. Dr. Alexander Kent, of Washington, was selected for this purpose, who began at once to organize a depot for his supplies and to study the special needs of the sick and troops. On his arrival he sought advice as to the character of work desired from the society, and expressed a willingness to perform such service as was considered for the best interest of all concerned. I very plainly informed him that while I did not think it advisable to surrender the care of our sick to the physicians and nurses of his society, I was perfectly willing to accept any assistance in the way of hospital supplies, foods, milk, ice, linen, etc., that he would give. I could not clearly see how hospitals administered by the Red Cross Society could look after the records of the sick and wounded, matters of such importance to the Government, especially where pensions were concerned. Dr. Kent realized the importance of the paper work in connection with the care of the sick, and was perfectly willing to limit his work to supplies. He rented a suitable building in the city for his supplies and generously issued them to hospitals and regiments. In addition to special articles of diet, such as are usually given invalids, he issued hospital cots, mattresses, pillows, sheets, slips, pajamas, cooking utensils, crackers, towels, grape juice, ice, milk, broths, bouillon, cooking stoves, tableware, and even a large circular tent for the Second Division Hospital. Ice was distributed in large quantities, free to all of the regiments, during the summer. Dr. Kent proved himself to be a man of very broad gauge, was exceedingly active and industrious, and spent the greater part of each day with his son in visiting the camps and looking after his work. It is only fair to state that the Red Cross Society materially assisted in caring for our sick at a time when hospital supplies were scarce, and time an element of great value in securing them. In addition to the work done by the American National Red Cross Association, valuable contributions were received from other benevolent societies and individuals, among whom may be mentioned the Daughters of the Revolution, Connecticut Sanitary Relief Society, Woman's National War Relief Association, Soldiers' Patriotic Society, of Staunton, Virginia, Miss Helen Gould, Messrs. Paris, Allen & Co., of New York, Garrett & Co., of North Carolina, etc. One of the most valuable contributions was furnished by Mr. Edson Bradley, of New York—five barrels of superior blackberry brandy—which proved later to be a very acceptable gift on account of intestinal troubles.

Division hospitals.—The organization of the division hospitals went on pari passu with the organization and growth of the divisions themselves: all of these hospitals being in operation by the middle of July. Owing to the temporary association of the first division at Tampa, Fla., the establishment of a hospital was not attempted for it. All of the division hospitals of the Seventh Army Corps were practically arranged and established on the same plan, except where changes in certain minor details became necessary on account of the conformation of the site or its environment. The wards radiated from a common center, and presented very much the appearance of the radiation of spokes from a hub that had been bisected. This arrangement possessed very many advantages over any other disposition of tents, and enabled the surgeon in command to keep a better supervision over the entire hospital. Each hospital was divided into 6 wards, and each ward into 4 or 8-ward sections, according to the necessity for greater or less accommodation. Ward sections consisted of two hospital tents, which were separated from the adjoining section by the space of one tent. All of the tents, as well as the spaces between ward sections, were floored, the open spaces being covered either with boughs or tent flies. These open spaces were utilized for ice boxes, benches for holding hand basins, ward utensils, and the barrel containing the disinfectant for hands. It was found necessary to locate a barrel of one four-thousandths bichloride solution for the purpose of disinfecting the hands after handling and attending to the typhoid fever cases. Each barrel was placed upon a bench and provided with a wooden spigot. All of the tents were framed and side railed, and many inclosed in wire mosquito bars.

The protection afforded patients against flies, mosquitos, and other insects fully compensated for the additional cost involved; besides, less attendants were needed for these wards. The general complaint that flies were frequently seen crawling in the mouths of typhoid patients could never have been lodged with this arrangement. Each tent was provided with not more than 5 cots, as a rule, though on several occasions it became necessary to place 6 in them. Four cots is a much more satisfactory number, and should be prescribed as the regulation number for ordinary cases. Not more than 2 very serious cases should be treated in one tent, and where death is imminent all other cases should be removed. Patients should be spared as far as possible the depressing scenes which surround the death bed. The radiating plan for wards, in my opinion, affords the most satisfactory arrangement, when the site will conform or when the hospital is not intended for more than 400 cases. No matter what system be adopted, it will always be found necessary to locate at quite a distance from the main hospital certain groups of tents for the isolation of measles, mumps, and other infectious diseases. Owing to the large number of cases treated at one time, both in the second and third division hospitals, a number of additional wards were pitched in the rear and at the sides of the main groups.

All of the division hospitals were provided with mess and diet kitchens, storerooms, bathrooms, ice house, and small buildings for the disinfection of bedding and clothing. The diet kitchen became a special feature of each hospital and was liberally supplied with ranges and cooking utensils. A number of blue-flame kerosene cooking stoves were purchased for these kitchens and were found very satisfactory. Each diet kitchen was provided with two lock storerooms, and these buildings, as a rule, were well screened against flies. A cold-storage room for keeping meat, milk, etc., was also built in connection with the diet kitchen. These hospitals were also provided with well equipped operating tents, which were conveniently located with regard to the surgical wards. They were well fitted out with sterilizers, operating tables, instruments, and abundance of surgical dressings, and proved entirely satisfactory for the numerous surgical operations which were performed in them, including quite a number of abdominal sections, besides other operations of a serious nature. The hospital sinks were located about 100 yards distant from the hospitals. The sewer system was employed at the first division, the tub system at the second, and the pit system at the third. The disposition of the fecal matter at each division hospital conformed to the method employed among the troops of that division. The attendant was required to pour over each dejection immediately after its passage, a 5 per cent solution of carbolic acid. The bed pan was then emptied into galvanized buckets, which were kept in closed boxes adjoining each ward; bed pans were rinsed clean and dried. The pails were then carried to the closets, emptied, rinsed, and returned to the boxes. Six negroes were employed at each hospital by authority of the Surgeon-General for the purpose of emptying the buckets, at a salary of $30 per month.

The sites of division hospitals were selected with regard to the convenience of the troops, sanitary environment, and other natural advantages. The sites selected in Jacksonville, as a rule, were on sandy soil and located in pine groves. All of these sites were regarded as specially desirable, were fairly well shaded, and quite picturesque in appearance.

Receiving tents at division hospitals.—A receiving tent, or series of tents, was established at each division hospital for patients coming directly from regiments. The receiving hospital at the Second Division hospital consisted of a circular tent with a capacity of 30 beds, and was in charge of 1 medical officer, 1 acting steward, and 3 privates. The receiving hospital served as a point for observations, as well as an emergency hospital. Patients sent to the receiving tents were given a bath and assigned to wards. In some instances patients were detained there for several days to determine the nature of fever or disease. The receiving tent, as a rule, was located near the entrance of hospital grounds and in the vicinity of the bath house.

Pavilion hospitals.—A number of pavilion wards were constructed at each division hospital early in September. It was believed that better results could be obtained in the treatment of typhoid in buildings than tents. A pavilion hospital of 5 radiating wards was constructed at the First and Second Division hospitals. The same number of wards were also built at the Third Division hospital; but, owing to the conformation of the ground the buildings were arranged parallel to each other, on a street. Each pavilion was divided into 2 wards 50 feet long, 22 feet wide, and 10 feet high to the eaves, besides the roof space; ridge and wall ventilation were provided in each ward. A small room was constructed between the two wards in each pavilion, which was intended as a room for medicines, icebox, clothes, ward utensils, and for the preparation of certain articles of diet. These buildings were constructed of rough pine lumber, covered with tar paper, and elevated 2 feet above the ground. Each ward had a capacity of 20 beds. Pavilion wards were also constructed, in connection with the division hospitals in Cuba, for the treatment of yellow fever and smallpox. The cost of each pavilion ward at Jacksonville was about $150, or $2,250 for each pavilion hospital affording a capacity of 200 beds per hospital.

Hospital equipment for typhoid-fever cases.—The regulation canvas cot, while suitable for ordinary field purposes, was found unsuitable for the treatment of typhoid fever and other serious cases where the decubitus had to be maintained for long intervals. Many of the fever cases suffered from bed sores, which resulted from lying on hard inflexible canvas bottoms of these cots. I personally examined into this matter and found a prejudice against these cots to be almost universal among surgeons, who had experience with them in connection with typhoid cases. The fact was represented to the Surgeon-General, and iron bunks with woven wire bottoms requested. He very promptly complied with this request, sending several hundred to each division hospital by express or fast freight. The canvas cots were finally sent to Pablo Beach or turned over to the regimental hospitals. Each cot was supplied with a palmetto mattress and pillow, sheets, pillow slips, blankets, etc., and the sick were made as comfortable as if treated in regular hospitals. Water beds, air rubber beds, and about 20 bath tubs on wheels were also sent to the Seventh Corps for the treatment of fever cases.

Guard and guardhouse for division hospitals.—A guardhouse or guard tent should be provided at every division hospital for the members of the hospital corps and drunken or refractory patients. A detail of at least two companies should be made for this purpose, which should remain at least ten days on duty at the hospital. As a matter of course the size of the guard should correspond to the number of patients and personnel of hospital corps. A guard is needed not only to protect Government property connected with the hospital, but to preserve order and discipline. Four posts should be arranged for a division field hospital of 400 or 500 patients, which necessarily contains a personnel of 250 to 350 men. Without a proper hospital guard it is impossible to maintain proper discipline, or to carry out the necessary regulations in regard to visitors, peddlers, and other unauthorized persons who frequently gravitate to these hospitals. Unless the grounds are inclosed in fences it is liable to be hampered with vehicles, etc. The guard at the hospital could likewise take care of the refractory members of the ambulance company, which should be located within a reasonable distance of the division hospital. The discipline of the division hospitals belonging to the Seventh Army Corps was greatly impaired on account of a lack of sufficient guards. The matter was represented officially from time to time, but as a rule only a single sentry post could be secured for each division hospital. The guard on duty at a division or general hospital should be under the command of the surgeon in command of the hospital. Many of the hospitals were overrun by relatives, friends, or the general public, who desired to visit the sick for personal reasons or from morbid curiosity. It became necessary to issue very strict orders on this subject, but owing to the lack of the necessary guard it was impossible to have these orders properly enforced. I am thoroughly satisfied that the recovery of many of the typhoid cases was retarded by articles of diet surreptitiously furnished them by visitors, and probably the death of some few. The following circular was issued on this subject from the headquarters of the corps, August 17, 1898:

"Upon the recommendation of the chief surgeon, the following regulations governing the administration of division and reserve hospitals are published for the guidance of all concerned:

"1. Friends and relatives of patients undergoing treatment in division hospitals will be permitted to visit such hospitals only between the hours of 3.30 and 5.30 p. m. daily, except when otherwise permitted by special authority of the surgeon in charge.

"2. Horses and vehicles are prohibited from passing or driving through the hospital limits except for the necessary service to the sick.

"3. Troops are prohibited from marching through the limits of the hospital grounds.

"4. Surgeons in charge of division hospitals are authorized to close any or all wards to the public, when in their discretion it is for the best interest of the sick.

"5. The general public will be permitted to visit the division hospitals on Sunday afternoons between the hours of 3.30 and 5.30, under such restrictions as are deemed necessary by the surgeon in charge."

The laundry and care of linen at division hospitals.—The care of the soiled linen at division hospitals was placed in charge of a hospital or acting hospital steward, who as a rule was assisted by one or more privates. A small frame building, with lock, was constructed at each division hospital for the collection and disinfection of the soiled sheets, towels, pajamas, etc. All of the linen used by typhoid patients was soaked in a solution of bichloride of mercury and dried before being turned over to the laundryman. An effort was made to keep a correct list of articles sent out and received back. It seemed almost impossible to perform this duty correctly, owing to the fact that the washing was so enormous and the work was done by contract. One can readily imagine the quantity of linen needed and soiled daily in a field hospital containing 600 to 700 patients, 80 per cent of whom were suffering from typhoid fever. Several wagonloads were taken away daily from each hospital, so that it was impossible to keep a perfect record of the quantity sent and received. The laundry plant was kept busy, and the proprietor returned it as fast as he could, without regard to a daily list received. I learned that thousands of sheets, towels, and pieces of underwear were never returned. Many of these articles were given by the Red Cross Society, so this deficit as a rule did not involve the property return of the hospital. A portable laundry should be issued to division hospitals in the field.

General operating hospital for the corps.—A general operating hospital was organized for the corps in Savannah, Ga., and placed under the charge of Maj. George R. Fowler, who was chief of the operating staff in the field. A brick building was rented and equipped for this purpose. The staff consisted of 2 acting assistant surgeons, 1 hospital steward, 1 acting hospital steward, 4 privates, and 5 female nurses. The operating hospital had a capacity of twenty beds, which were generally kept well filled during its existence. This establishment served also as an emergency hospital for the provost guard which was stationed in the city of Savannah. A large number of operations were performed, such as herniotomies, appendicectomies; removal of varicoceles, varicose veins, and large glands, and other surgical lesions. The usual hospital records were kept and official reports made. When the corps was transferred to Havana an operating hospital was organized in connection with each division hospital.

Convalescent hospital at Pablo Beach, Fla.—Owing to the increase of sickness toward the latter part of July and the overcrowding of the division hospitals, it became necessary to establish a place for the convalescence of patients recovering from fevers and other climatic diseases. Besides, at this time there was a large class of young soldiers who were suffering from gastro intestinal disturbances and general debility, resulting from prolonged heat and camp-life irregularities, who likewise needed a decided change. Few of the latter class were on sick report, while in reality they were unfit for duty. I believe the temporary sojourn of these men at the seashore averted many cases of serious illness, since their systems as a rule were unable to successfully withstand typhoid infection. In consideration of the above the following letter was written July 26 by me to the corps commander:

"I have the honor to recommend for the consideration of the commanding general of the corps, the establishment of a camp of recuperation at Pablo Beach, Fla., for the convalescents and others belonging to the corps who are suffering from impaired health as a result of climatic influences. In my opinion, a sojourn of a week or ten days at this health resort, which is only 16 miles from Jacksonville, will be of incalculable value to these men. They will be enabled to take the surf baths twice daily and enjoy the invigorating sea air, which would in a very short time restore them to a normal condition.

"The policy of the Administration at present is to send this class of men to the North for the purpose of convalescence to general hospitals at Atlanta, Ga., Fort Myer, Va., Fort Thomas, Ky., and Old Point Comfort. In my opinion, this would be unnecessary for the Seventh Corps with the establishment of a camp as suggested above.

"It is noted that in each regiment there are from twenty to fifty of the younger men who have become more or less anæmic and weak through the intense heat, and a change for a week or ten days in such cases would prove very beneficial. From an economical standpoint it would also be of advantage to the Government."

The First Division about this time was at Miami, Fla., but was transferred to Jacksonville a few days later. More than one hundred men of this command were transferred to Pablo a few days after its arrival, which occurred during the first week in August. The place selected for this establishment was Pablo Beach, a small seacoast resort, 16 miles away from Jacksonville. Pablo enjoyed a fair local reputation as a resort, and was considered practically free from malaria. Very fortunately it contained a very large unfinished two-story hotel, with a capacity of 350 beds. The corps commander took an active interest in the matter, and issued a very generous order on the subject, by which I was enabled to organize within a very few days a very pleasant home for 350 soldiers, who needed just such a change. The hotel was surrounded by piazzas, both upper and lower stories, and was located within 100 yards of the beach, which is one of the very best in the South. The temperature of the water was delightful, and the baths became a strong factor in the recuperation of the invalids sent there.

Stringent orders were issued in regard to bathing hours, no one being allowed to take a dip after 9 a. m. or before 5 p. m., nor were they allowed to remain in the water more than thirty minutes. The establishment was provided with a large mess pavilion in the angle of the building facing the sea, which was covered with paulins. These tables had a seating capacity for about 400 people. Sinks were provided on the dry-earth system, and water was conducted to the building from an artesian well not far away. A cold-storage room was built convenient to the kitchen, for the ice and stores purchased in Jacksonville. Through the generosity of the Red Cross Society, plated knives, forks, spoons, and many other useful and necessary articles were furnished. The Quartermaster's Department supplied ranges and cooking utensils. The assistance of Lieut. Col. George E. Pond, chief quartermaster, greatly enabled me to organize this hospital within a very few days after its inception. The sick of the corps will ever remain in his debt for his valuable aid at this time, as well as on many other occasions. Two civilian cooks were employed at $60 and $40 per month. The Secretary of War allowed the 60 cents per day for each soldier, which placed this establishment on the footing of a general hospital. One surgeon and one assistant surgeon were sent down, with a half dozen hospital corps men and two hospital stewards. Pablo was never intended as a hospital for those actively sick, but was organized purely as a point of recuperation, and consequently very stringent orders were issued to regimental and division hospital surgeons regarding the character of cases sent there. Patients suffering from active fever especially were to be avoided. The following circular was issued August 16, 1898, to medical officers on this point:

"Regimental surgeons are requested to select with great care men who are recommended to go to the convalescent camp at Pablo Beach. Only such men will be recommended whose health, in the opinion of the regimental surgeon, requires a transfer to the convalescent camp. Patients suffering actively from fever will not be sent. The names of all men sent to the convalescent camp at Pablo Beach will be sent in to the chief surgeon on the day of their departure. Tuesdays and Fridays have been recommended to the corps commander as days for the transfer of men to Pablo Beach.

"Regimental surgeons are also requested to examine very carefully all men sent to division hospitals, and not order there such men as can be properly treated in quarters. It is believed that gonorrheal diseases, and those suffering from slight indispositions, such as mild attacks of diarrhea, indigestion, etc., can be cared for in quarters. Many men now sent to the division hospitals will probably recover from their temporary ailments after a few days in quarters, where they would be relieved from all military duty, and be able to avail themselves of rest. The division hospitals are at present becoming overcrowded with many cases, which, in the opinion of the chief surgeon, could be properly treated in quarters."

In spite, however, of my precautions many cases were sent there with high temperatures, and others developed typhoid fever after arrival, the infection being in the system at the time. For this reason it became necessary to organize a hospital in connection with this for such cases. A cottage with a capacity of twenty beds was rented for this purpose. Much difficulty was experienced in securing an officer of experience for this establishment. There were no regular surgeons in the corps whose services could be spared, and it became necessary to detail a volunteer. Several changes were made before a suitable officer was found, and I believe I can safely say, that no one ever sent there performed their administrative duties properly. Maj. A. H. Appel served as commanding officer for a short while, but on account of ill health he was forced to leave. The paper work connected with the establishment was never satisfactorily performed, and I do not believe a complete record of those sent there was ever kept. I believe, however, that over 1,500 soldiers were ordered there for recuperation. On August 10 the hotel was filled to its utmost capacity, over 400 invalids being present, and a large number remaining over in camp who should have been sent. In order to enlarge the accommodation I wrote the following letter August 10, 1898, to the corps commander. The proposition met with his approval.

"I have the honor to report to the commanding general of the corps that the convalescent camp at Pablo Beach is running very satisfactorily, and has already been productive of great good. The hospital rented for this purpose will be filled after those men who have been recommended there arrive, together with those in the institution at present. I find the capacity of the building not over 350, and would now recommend that in addition to the hotel accommodations, a camp of fifty or more common tents, or its equivalent in conical wall tents, be established for debilitated soldiers coming directly from their regiments, and to reserve accommodations in the hotel for those who have suffered from illness and are convalescents, such as are treated in division hospitals. I would also recommend that an officer be detailed to take care of this canvas camp, who will also take charge of the feeding of the men.

"In my opinion, a great deal of good can be accomplished in this way. There are still a number of men in the regiments who, though not sick, are scarcely able to do duty, and, in my opinion, a rest of from seven to ten days at Pablo Beach would be a great benefit to these men, and would prevent probable illness in many cases. It seems to me that with these two institutions, the hotel for convalescents from division hospitals, and the canvas camp for men who have become debilitated through climatic influences, there will be abundant accommodations for all requiring convalescent treatment in the corps."

The canvas camp was established on a square near the hotel, and was provided with an independent mess pavilion and kitchen. All of these tents were nicely floored and arranged and placed under the administration of Capt. J. Wash Young, Second United States Volunteer Cavalry, who very ably and conscientiously performed his duties. No serious cases were sent to this camp. Owing to the irregularity and confusion in sending patients to Pablo, the following circular order was issued for corps headquarters, August 17, 1898:

"The chief surgeon of the corps reports that considerable confusion has resulted from the method now in vogue of sending men to the convalescent camp at Pablo Beach. Until further orders, the enlisted men will be sent there and returned here as follows: Tuesdays and Fridays are designated as days of transfer from this camp, and men will not be sent on other days unless specially recommended by the chief surgeon. Orders of transfer will be issued, as heretofore, on each of the above days. All men in the different regiments that have previously been ordered transferred will be sent under a regimental noncommissioned officer, who will be provided with a list containing the name, initial, rank, company, and date for which rations have already been drawn for each of the men transferred. These details and lists will be at the office of the chief surgeon at 1 o'clock p. m. The men will there be reported to a medical officer, who will check the lists furnished by regimental commanders. This medical officer will consolidate the regimental lists, secure transportation, and accompany the detachment to Pablo Beach. There he will turn it over to the medical officer in charge and return to this camp, submitting a report to the chief surgeon, with the consolidated lists above referred to, which will be transmitted to these headquarters. Men in division hospitals will be transferred under similar orders, but in such manner as directed by the chief surgeon of the corps, report being submitted as above.

"Enlisted men will be returned from the convalescent camp to their regiments as soon as sufficiently recuperated. Applications will be submitted through the chief surgeon for orders for return transportation in ample time. A daily report will hereafter be submitted by the officer in charge of the convalescent camp of all enlisted men sent to their regiments. These reports will be submitted through the chief surgeon of the corps and sent promptly to these headquarters, in order that regimental commanders may receive the proper notification.

"A strict compliance with the foregoing instructions is required."

Provisions were also made at Pablo for the recuperation of officers, who likewise were recovering from fevers or other debilitating diseases. They were required to pay $1 a day to the mess-fund account of the convalescent hospital. Quite a number of officers availed themselves of the privilege. A circular was issued to regiments on this point. A few cottages were rented near the hotel for the accommodation of the officers. The convalescent hospital at Pablo Beach served a most excellent purpose at a time when there was no other method of disposing of men not able to join their regiments, and for whom there was no place in division hospitals. It must be remembered that the Seventh Army Corps was relieved of no sick by hospital trains before the 3d of October, and up to this time General Orders No. 114, 1898, had not been issued. After the publication of that very important but greatly abused order, Pablo's popularity began to decline, the men preferring a trip home to transfer there. It was finally used as a brigade hospital for the Second Virginia, Third Nebraska, Second New Jersey, and Forty-ninth Iowa, and closed up about the 15th of November.

Regimental hospitals.—General Orders, No. 4, headquarters Seventh Army Corps, June 4, which was issued on my recommendation during the organization of the corps, abolished regimental hospitals. Under the instructions embodied in this order, regiments were simply permitted a dispensary and place for holding sick call. Each regiment was allowed to retain one hospital tent, which was used as an office and for holding sick call, and another for dispensary purposes. All soldiers requiring hospital treatment were sent after sick call to the division hospital. In a very short time the volunteers became accustomed to the new arrangement of caring for their sick, and as far as I can learn there were few objections. Several of the regimental officers, however, preferred to have their sick treated in the regiment. The surgeons, as a rule, very soon learned the necessity for the abolishment of regimental hospitals.

During the annual encampment of State troops, regimental hospitals do fairly well, there being few or no sick present, but in the field, with hundreds affected with fevers and intestinal disturbances, it becomes an entirely different matter. Almost every regiment serving at Jacksonville during the summer of 1898 would have required a hospital almost as large as the division hospital contemplated by the scheme submitted at the beginning of the war from the War Department in order to properly care for their sick. Not a few of these regiments had over two hundred men sick in hospital and quarters at one time. I endeavored, as far as possible, to provide each regimental surgeon with a field desk, medical chest (Nos. 1 and 2), pouches, litters, and all of the necessary medicines and dressings for ambulatory cases. They were very liberally supplied in this direction, and I believe there was no complaint on this score. I endeavored to secure for each regiment a folding operating or examination table. Very frequently it becomes necessary to make abdominal examinations in the supine position, insert a catheter, or to do some minor operation, where a table is necessary. I believe a folding table with tubular legs supplied with braces would serve this purpose well, and should form a part of each regimental hospital equipment. Regimental surgeons were especially directed to send all cases requiring bed treatment to the division hospitals as soon as this necessity was recognized. Whether a few of these officers were opposed to sending their men to division hospitals for treatment, or whether they did not recognize the gravity of the cases, a number of instances occurred where men were sent to hospitals a few hours or days before death, from typhoid fever, appendicitis, and other grave conditions. These cases, as a rule, were investigated and the medical officers found guilty of neglect or professional unfitness. One regimental surgeon especially was found holding a large number of cases in tents, whom he supposed were suffering from malarial fever, but who in reality had typhoid. The unsuitability of this officer was reported to the Governor of his State, and a request made to appoint his successor, which was promptly done.

The personnel of the hospital dispensary under the summer arrangement consisted of one regimental hospital steward, one acting hospital steward, and two privates. Besides, a litter squad of four privates was detailed from each company of the regiment, which likewise was under the control of the surgeon during drills, marches, etc. An ambulance was always ordered to accompany each regiment on drills, parades, etc. I attended the sick calls of a number of the regiments from time to time, and found that a great many privates presented themselves for medicines or surgical dressings. The volunteer soldier seems to be affected with a multitude of trivial complaints, which would never be considered by regular soldiers. Of course, the volunteer surgeon, who as a rule at home is never sent for unless needed, would spend a considerable amount of time over such cases, and consequently sick call lasted several hours. In some instances, as many as one hundred men were present at sick call. The medical officers knew nothing about conducting this important duty, and as a result, when it was over they had only a vague idea of who was sick. The company officers and noncommissioned officers were as ignorant of their duties in this regard as the medical officers, and rarely had half the names of the men of the company who were sick present at sick call. I furnished regimental surgeons with the following memorandum for their guidance at this call.

"There should be always present at sick call one hospital steward and one hospital private, or two hospital stewards. One of the stewards should be employed in assisting the regimental surgeon in making out the necessary reports and keeping the records of the company's sick; the other steward or private should dispense the medicine to the sick during sick call. The surgeon should provide himself with a blotter, ruled off with the following beadings: Name of soldier, Company, Quarters, Hospital, Duty, Diagnosis, and Prescription.

"The first sergeant of each company or one of the duty sergeants should appear at the regimental dispensary every morning with his company sick book properly made out, and the sick of the company present. The steward should assist the surgeon in the clerical work during sick call, and should transcribe the names of all the sick from the different company books to the above-mentioned blotter; this, after being properly filled out at the time of sick call, will answer as reference for making out the daily morning sick report to be sent to the regimental adjutant's office.

"The surgeon should provide himself with two small tables or boxes, which can be used by the surgeon and steward in making out the books in lieu of desks.

"As each company comes up, and it is examined, the steward will note on the blotter whether the man is marked "Hospital," "Quarters," or "Duty," and enter his diagnosis and prescription. After each company has been examined and assigned to "Duty," "Quarters," or "Hospital," the surgeon will turn over to the first sergeant his company book. The sick soldiers should remain for their medicines, which will be given them by a dispensary private or second steward. All soldiers marked on the company sick book should present themselves at sick call, and if they are too sick to leave their tents will be sent to the division hospital. This blotter should be kept neatly and will be very useful as a record book for the surgeon. The daily morning sick book of the surgeon should be sent to the adjutant's office in time to make out the consolidated regimental report for the day."

Owing to pressure brought to bear on the War Department during the early fall, the following order for the reestablishment of regimental hospitals was issued:

[Circular letter.]

HEADQUARTERS OF THE ARMY,
OFFICE CHIEF SURGEON,
Washington, D. C., October 1, 1898.

THE CHIEF SURGEON, UNITED STATES FORCES,
Jacksonville, Fla.

SIR: The equipment of regimental hospitals authorized in General Orders No. 131, Adjutant-General's Office, 1898, will be required for on a basis of ten beds, and requisitions will be made at once to supply all articles that may be deficient.

Of enlisted personnel there should be, in addition to the three hospital stewards allowed by law, 1 acting hospital steward, 6 privates of the hospital corps as attendants, 1 private of the hospital corps as cook, 3 privates of the hospital corps as ambulance drivers, 2 privates of the hospital corps as wagon drivers.

If enlisted men cannot be obtained as drivers, requisitions should be made on the Quartermaster's Department for civilians.

The tentage should consist of 4 hospital tents, 2 to be used as wards, 1 as dispensary, and 1 for dining and office; 3 common tents for privates, 1 common tent for noncommissioned officers, 1 common tent for cook tent, 1 "A" tent for latrines.

The number of ambulances and mounts should be that fixed in General Orders, No. 76, Adjutant-General's Office, 1898, and two four-horse wagons will be required for transportation of material. For this property, requisitions should be made on the Quartermaster's Department. Of medical supplies, those laid down in paragraphs 265 to 290, Manual of Medical Department, 1898, should be followed, excepting 260, 261, 272, and 279, which will be omitted, and paragraphs 273, 277, and 279, which will be modified to a standard of ten beds.

You will at once notify regimental surgeons of this matter, and require them to make a personal inspection of all their property with a view of ascertaining deficits (which must be promptly supplied), and report to you in person the result of the inspection.

The Chief Surgeon of the Army will visit each camp in a few days and may be consulted regarding any matter that is in doubt.

CHAS. R. GREENLEAF,
Colonel, Assistant Surgeon-General, U. S. A.
Chief Surgeon Army in the Field.

Owing to the fact that the corps was on the eve of leaving Jacksonville for Savannah about the time that General Orders, No. 151, Adjutant-General's Office, was received, it was impossible to organize and equip regimental hospitals before it arrived there. It was found, however, that some few of the regimental surgeons had practically gotten together from six to ten hospital tents a short time before leaving for Savannah, and in some instances as many as 50 cases were found under treatment in them. When these regiments left they very naturally transferred all of their sick to division hospitals, which fact alone testified to the inability of regimental hospitals to care for the sick of their regiments under unusual conditions, or when moves are contemplated from time to time.

I do not believe it practicable or for the best interest of the service to establish independent hospitals for regiments which are brigaded or serving in divisions. The sick in my opinion would be looked after more carefully in brigade or division hospitals, and the interests of the Government better subserved. The following extract has been taken from a report to the Adjutant-General of the Army on regimental hospitals, dated October 25, 1898: "The regimental system of hospitals was established for cases of minor importance and especially as a hospital of detention. If regimental hospitals are organized sufficiently to care for the sick of a regiment, then division hospitals will become unnecessary and will only be used at a time when regiments are ordered away, in which case they will simply become a dumping ground for the sick remaining at the time of departure of the regiment. If regimental hospitals are to be continued their equipment must be increased to accommodate the sick. There can be no halfway arrangement about this matter. If it is intended to continue regimental hospitals as a place for minor ailments or point of detention in accordance with the present order, it will become necessary then to order a daily medical inspection of each regimental hospital to see whether the medical officers are doing their duty properly." Regimental surgeons can scarcely prevent themselves from assigning men to the regimental hospitals, especially when personal demands are made on them, not only by the men themselves but by the officers of the regiment as well, who can see no good reason why one man is treated in the regiment and another sent to the division hospital. Hence, constant friction between regimental officers and the administrative department is likely to occur. From my experience, I would unhesitatingly say that when troops are encamped together in the field, if a brigade be present, that the sick should be treated in a brigade hospital, and in a division hospital if two or more brigades are serving together. Should some unusual epidemic, as typhoid fever, occur, as was the case in our southern camp during the summer of 1898, whereby division hospitals were doubled or trebled in size, I believe it would then be best to organize brigade hospitals in divisions.

Hospital tent for observation in connection with regimental dispensaries.—Before the establishment of regimental hospitals, per General Orders, No. 151, and when the regimental dispensary was not supposed to contain cots, regimental surgeons were instructed to make requisition for one hospital tent and six cots with equipments complete, for the purpose of establishing a hospital of observation in each regiment. Not infrequently men were held in quarters in regiments for two or three weeks who had been suffering from typhoid fever without the knowledge of regimental surgeons. And, on the other hand, men were often sent to division hospitals, presumably ill from fever, who were suffering from slight ailments. In order to prevent either class of error a hospital for observation was regarded as necessary, and hence the following letter dated August 31, 1898, to chief surgeons of divisions:

"Chief surgeons of divisions are requested to instruct regimental officers in charge of regiments to make requisition for one hospital tent and six cots, for the purpose of establishing a hospital tent of observation for all of those cases of fever undetermined in character.

"Chief surgeons will instruct regimental surgeons to place such cases of undetermined fevers in this tent of observation, where they will be kept not longer than three days, and at the end of which period, if the fever exists, these cases should be sent to the division hospital.

"Regimental surgeons will also make requisition for the proper flooring for these tents."

This measure was put into execution and proved very beneficial. There was considerable complaint from surgeons in command of division hospitals in regard to the serious condition which fever patients attained before being sent to the division hospitals. Regimental surgeons had been repeatedly directed to retain in the regiment only those cases suffering from slight or minor ailments and to send to the division hospital at once all serious cases. Patients at times were kept in quarters suffering from typhoid until they were practically dying. Not infrequently did men die from this disease in less than twenty-four hours after arrival at hospital. I found it necessary to take official action in certain of such cases. The following is a letter, dated September 5, 1898, to the adjutant-general of the corps on the subject:

"I have the honor to request that the inspector-general be sent to investigate the circumstances connected with the death of two members of the —— regiment, one of whom died in the third division hospital and the other in the regimental hospital, within the last few days. The surgeon in command of the third division hospital informed me that one of these men died within a very short time after he was sent to the division hospital, and that the other man died while under treatment in the regiment. It appears that there have been a number of men sent to division hospitals who were practically in articulo mortis before transfer by the regimental surgeons. The regimental surgeons have received definite instructions in regard to the character of cases which should be treated in regimental hospitals, and the duration of time they should be allowed to remain there before being sent to division hospitals. They have frequently been informed that nothing but trivial or minor cases should be treated in regimental hospitals, and, in my opinion, any surgeon found violating these instructions should have charges preferred against him for violation of orders. I believe that a large number of deaths in this corps are directly traceable to criminal carelessness and ignorance on the part of regimental surgeons in regard to this matter."

The surgeons were not altogether responsible for these unfortunate accidents; frequently the men would lie about the camp ill, without going on sick report, for several weeks after the development of the fever.

Allowance of tentage for the personnel of division hospitals and ambulance companies.—Under the provisions of General Orders, No. 76, Adjutant-General's Office. 1898, each ambulance company was allowed nineteen common tents, and division hospitals seventeen. The personnel of an ambulance company consists of 7 hospital stewards, 3 acting hospital stewards, and 104 privates, or one tent for every 6 men, including the non-commissioned officers. A common tent has the following dimensions: 6 feet 10 inches by 8 feet 4 inches, or a floor space of about 50 square feet. Since no man can comfortably occupy less than 2 by 6 feet, it will be readily seen that 6 men require 72 square feet; on account of cramped quarters and hot weather, many of the soldiers preferred to sleep outside or under a shelter tent. Not more than 4 privates or 2 non-commissioned officers should be required to occupy one common tent. A conical tent will provide shelter comfortably for about 16 men. The allowance for the regiment was at the same ratio as prescribed for ambulance companies and division hospitals, and likewise resulted in considerable discontent among the men. Thirty-one common tents should be provided for one ambulance company, or 10 hospital and acting hospital stewards and 104 privates, and 28 for a division hospital. The provisions of General Orders, No. 76, were practically disregarded later in the season for both regimental and medical organizations. Over one hundred common tents were required to shelter the personnel of the hospital corps at the Second Division hospital in Jacksonville, Fla.

Department of dentistry.—On account of the large number of men belonging to the corps, who suffered from toothache, bad teeth, and other troubles of the mouth, I determined to organize a department of dentistry. I had learned previously that quite a number of the members of the hospital corps were dentists as well as physicians. Hospital Steward J. W. Horner, U. S. A., was assigned to the duties of corps dentist and Acting Hospital Steward Watts was detailed as his assistant. Suitable rooms were hired by the Quartermaster Department for offices in each of the cities where the corps was serving. Dr. Horner equipped the offices with his own instruments, and also furnished the necessary material for filling, etc., and agreed to do the work gratuitously, only making a nominal charge for material used, which, as a rule, amounted to very little. After the establishment of his office, the following circular, dated September 30, 1898, was issued by the corps commander:

"Dr. J. W. Horner, corps dentist, has established himself in his office on the corner of Forsyth and Main street, and in the Hubbard Building, and is now ready to attend to the teeth of any member of the Seventh Army Corps. Dr. Horner is to do all of the dental work for members of the corps free of cost, except for material furnished.

"Regimental commanders will cause this circular to be published by their company commanders to companies."

It was almost impossible to realize the great benefit which resulted to the troops from this department, located as they were in the field. Engagements were made as in civil life, and both dentists were kept busy from early morning to late into night. I was informed by the dentist that he was unable to attend to half the calls that were made on him. In my opinion every corps should be provided with a dental department consisting of one chief dentist with the rank of major, three dentists with the rank of captain, and three assistant dentists with the rank of first lieutenant.

Corps oculist and aurist.—During the early summer in Jacksonville regimental surgeons reported the presence of a large number of men who were suffering from various affections of the eye and ear, which they were unable to properly treat or care for. Many of these cases consisted of the ordinary acute catarrhal conditions which result from dust, irritation, colds, damp weather, and camp life. A number were of a chronic nature, and evidently had existed prior to enlistment. I found that these cases were not being successfully cared for by the medical officers, and that in some cases discharges were being requested on certificates of disability. I therefore considered it for the best interest of the service to detail an oculist and aurist for this special work. Maj. W. S. Bryant, brigade surgeon, who was on duty in the corps, was detailed as corps aurist, and Acting Asst. Surg. John Ling, U. S. A., as corps oculist. A contract was made with Dr. Ling by the Surgeon-General, at my request, for this purpose. A circular was issued to the medical officers of the corps to this effect, and they were directed to send all refractory cases to these officers for examination and treatment, a privilege of which they gladly took advantage. The detail of an oculist and aurist proved very advantageous, not only to the corps, but to the General Government as well. A large number of this class were restored to duty, whose services would have been lost, and chronic conditions detected, existing prior to enlistment among men, who would otherwise have become an additional burden to the country as pensioners.

Veterinary service for an army corps.—For nearly two months after the assembling of troops at Jacksonville no preparation had been made for the medical and surgical care of the animals. About the 22d of June I learned of the appearance of distemper among them, and submitted the following letter to the corps commander for the employment of one veterinarian and one assistant:

"I have the honor to state that there are between 500 and 600 mules and horses here, many of which are suffering from distemper and other affections. In my opinion it is necessary that the camp be provided with a veterinarian and one assistant. I would therefore recommend that application be made to the proper authorities for the permanent employment of one veterinarian and one assistant veterinarian for each division of the corps."

At this time only one division was present at Jacksonville, with about six hundred horses and mules. The importance of veterinarians should not be overlooked in the organization of an army corps. In my opinion the organization of the veterinary department for an army corps should consist of one chief veterinarian with the rank of captain, three veterinarians with the rank of first lieutenant, and three assistant veterinarians with the rank of second lieutenants, all to be mounted officers.

Discharges for diseases existing prior to enlistment.—An unusually large number of men were found in certain regiments belonging to the corps who had been mustered into the service, though suffering from manifest physical disqualifications at the time. This resulted partially from the carelessness of the examining surgeons at the time of muster, and partially from the eagerness of the colonels and other regimental officers, who were anxious to be mustered in as quickly as possible. In order to undergo muster, each regiment had to report so many men and officers present. The regiments with the largest proportions of these discharges were as follows:

First North Carolina, 100; Second Louisiana, 90; Fourth Virginia, 56; First Texas, 47; Second United States Volunteer Cavalry, 43; Ninth Illinois, 42; Fourth Illinois, 40, etc. Many of the remaining regiments had from 20 to 35. The principal disabilities consisted of hernia, epilepsy, syphilis, tuberculosis, heart disease, deformities, hemorrhoids, varicoceles, dipsomania, etc. As soon as I learned of this condition, a request was made upon regimental surgeons to send in the names of all men not fit for service. The following letter of instruction was furnished regimental surgeons relating to discharges on certificates of disability:

"In making out certificates of disability for the discharge of soldiers, the greatest care should be taken with both the certificate of the captain and that of the surgeon. The captain's certificate should state definitely the cause of disability, when the soldier became unfit for duty, if he knows, when the disease was contracted, if possible, what duty the soldier was on when disability was contracted, and cause of disability set forth in accurate terms.

"Captains of companies should get the exact medical phraseology from the surgeon, so that the disease entered on his certificate will agree with that on the surgeon's certificate. The certificate of both officers should also state definitely whether the disease was incurred in the line of duty or not. If this is not known to the captain and surgeon they should obtain such information from the friends of the soldier, or from other reliable sources. The greatest care is necessary in order to see that justice is rendered both to the men and to the United States Government on this point. If the disease was contracted prior to enlistment, the man has no claim on the Government for a pension, but if in line of duty, he then becomes a fit subject for a pension according to the laws of the United States of America.

"Many of the certificates which have been forwarded to this office for discharge have been very imperfectly made out, a number of the questions have not been answered, and the certificate of the captain and surgeon did not agree in these essential points.

"In order to prevent the loss of the blanks furnished companies by reason of being improperly made out and necessitating the use of other sets, I would recommend that the captains of the companies would confer with the surgeon and give him all of the information required in the certificate on a memorandum, and that the surgeon will then take the memorandum furnished by the captain and the blank certificates of disability to the division hospital, where proper instructions will be given them for making out the certificates. Of course, this would only be for a limited time, because it is hoped that the medical officers will become thoroughly acquainted with the proper methods of making out these certificates in a very short time."

Every case in which the disease was reported to have been contracted in the line of duty was especially investigated before action was taken by the chief surgeon of the corps. It is believed that fully 50 per cent of cases reported by regimental surgeons as incident to the service were upon investigation found to have existed prior to enlistment. There was an effort on the part of certain officers to secure discharges for their men with a view to pensions.

On account of the large number of men found among the volunteers who were physically or morally unfit for the duties of a soldier, a board of medical officers was organized for the purpose of examining into this matter and recommending such men for discharge as were found unfit for duty. The following order of assignment was issued July 11, 1898, from the chief surgeon's office:

"By authority of Special Orders, No. 4, headquarters Seventh Army Corps, dated June 4, 1898, a board of medical officers is hereby convened to meet to-morrow at 9 o'clock a. m., or as soon thereafter as practicable, for the examination of all enlisted men recommended for discharge on certificate of disability by the regimental surgeons. Second Division, Seventh Army Corps.

"Detail for board: Maj. George R. Fowler, chief surgeon, United States Volunteers; Maj. Jefferson R. Kean, brigade surgeon, United States Volunteers, and the surgeon in charge of each regiment being examined.

"The board will make a careful physical examination of the men submitted by the surgeons of the various regiments, and will recommend for discharge all cases permanently unfitted for the military service. A careful inquiry will be made with reference to date and cause of disability, which fact should be clearly set forth in the certificate of disability. Owing to the careless manner in which the physical examinations were made at the time of muster, the board will practically find that the disability in nearly every case presented for discharge, existed prior to enlistment. A certificate will be made out in the usual manner, signed by the company commander and surgeon in charge of the regiment.

"Proceedings of the board will be submitted to the chief surgeon of the corps after the completion of this work."

There were discharged 835 men from the Seventh Army Corps on certificate of disability from its organization until the last of February, 1899. Of this number 88 were discharged for diseases contracted in the line of duty and 747 for diseases existing prior to enlistment or not incident to the service. The importance of this matter was fully realized by the chief surgeon.

Sick furloughs under General Orders, No. 114.—The promulgation of this order rendered signal aid to the Medical Department at a time when assistance was most needed. The division hospitals and convalescent establishments at this time were full to repletion and large numbers of cases coming in daily. The policy of returning typhoid convalescents to regiments was doubtful, until at least one month after the defervescence of fever, on account of the diet they would be required to eat on their return. No hospital trains were sent to Jacksonville to remove the sick until in October, and consequently the provisions of General Orders, No. 114 were hailed with joy. Probably this was the most beneficent and greatly abused order issued during the entire war. Instructions were given medical officers in regard to the character of cases to be invalided home, and boards were appointed to examine all cases sent away; but in spite of these precautions, a number of cases too ill to be shipped were sent away, as well as a number of men who were able to perform duty. Quite a number of men suffering from gonorrhea and other venereal diseases were also permitted to avail themselves of sick furloughs at the expense of the Government. In these cases the surgeons either connived at the transaction, or did not have the moral courage to disapprove the applications of those not entitled to them.

Medical treatment of officers and soldiers not on sick report.—After the abolishment of regimental hospitals, members of the command not infrequently went to the city of Jacksonville for medical treatment. This practice was not confined to the officers alone, but existed among the rank and file as well. Such cases were never carried on the regimental or division hospital reports, and were entirely lost sight of on the medical records of the war. Recognizing the importance of this matter, especially with reference to the future burden the Government would have to bear in the way of pensions, I submitted the following letter to the corps commander:

"I have the honor to state that, in a letter of the 19th ultimo, I made a request that a circular be sent to the colonels of each regiment, informing them that no member of their command be allowed medical treatment outside of the division, except upon the special authority of the chief surgeon. In order to keep the reports of the sick and wounded in proper condition, and to keep a medical surveillance over the command, it is necessary that this should be done. The commanding general at this time complied with this request, and I believe that instructions were issued to that effect. Since that time, in a number of instances, his orders relating to this subject have been disregarded, and in a number of cases officers and privates have been permitted to go to the various boarding houses, hotels, and to St. Luke's Hospital in the city of Jacksonville for medical treatment, without my knowledge or authority.

"I would respectfully request that more definite instructions be published on this subject."

Several orders were issued on the subject prohibiting its further practice. I observed from time to time that both officers and men violated these orders, and quite frequently during the summer I heard of members of the command undergoing treatment in hotels, boarding houses, and hospitals in town. In each instance I would call the attention of the regimental surgeon to the fact and direct him to report to me the disease and circumstances of the case, and to convey the man to his division hospital in case it was safe to move him. The surgeon not infrequently informed me that the man was permitted to go to town on the pretext of a pass, while in reality the transaction was winked at by the colonel and company officers. The physicians in the city of Jacksonville, as a rule, denied the presence of typhoid fever among the troops, and claimed that the men were suffering from malarial fever. I feel quite thoroughly satisfied that a large number of these men actually suffering from typhoid fever were treated as cases of malarial fever by the physicians of Jacksonville.

Camp sanitation.—The following methods of disposal of night soil for the troops of the corps were employed at Jacksonville: First Division, sewer system; Second Division, tub system; Third Division, pit system.

The First Division was in camp along the banks of the St. Johns River, and was thus conveniently located for subsoil sewer system. Eight and 6 inch mains of ordinary tiling were laid for each regiment, over which were built, for each battalion, ordinary wooden troughs, provided with a seating capacity of forty men. The troughs were built on a decline and flushed from a faucet connected with the city water system. At the lower end a large circular hole was arranged with a plug which allowed the fecal matter to escape into the sewer below. Each trough was screened by a wooden structure. Arrangements were also made in this inclosure for the disposal of urine. This arrangement was perfectly satisfactory and afforded a thoroughly sanitary method for the disposal of both excretions. The Second Division was less fortunate. This division was located practically in the city limits, and the city board of health objected to the pit system, which in my opinion would have been less objectionable than the one employed, the tub system, which was adopted and put in operation before the arrival of the corps headquarters from Tampa. The tub system was arranged as follows: Whisky barrels which were sawed in half were used as tubs for the reception of the fecal matter and urine. Twelve to fifteen of these barrels were placed in a row in a wooden structure previously provided with an ordinary beam seat; these tubs, when about two-thirds filled, were removed through a swinging trap door in the rear of the superstructure and carted away to the city crematorium. Twice daily their contents were disinfected with crude carbolic acid or unslacked lime.

I do not believe that the disinfection was carried out properly on all occasions, and feel quite satisfied that during its removal a certain amount was spilled along the company streets as the carts and wagons were driven along. In this way it is possible that a number of these streets became infected, a fact which seemed to have been practically demonstrated by the large outbreak of typhoid in this division later in the season. The Third Division was located about 5 miles below the city in a district known as Panama Park. The troops were in camp here on sandy soil, in pine groves, almost an ideal place for the pit system. Each pit was dug from 6 to 10 feet deep, and likewise provided with ordinary seats, inclosed in a rough lumber superstructure. Great care was observed in the use of lime and earth to cover the fecal matter. A sentry was posted in the rear of each sink to see that every person covered his own dejection with a shovelful of earth. In addition to these precautions, a fatigue party under the charge of the provost sergeant visited each sink regularly twice daily for the purpose of disinfecting, and also to see that the fecal matter was properly covered. New pits were dug as needed, the old ones being carefully covered. The sinks as a rule were placed at least 100 yards on the flank of the regiment, and it seemed almost impossible that the typhoid infection could have been carried from these sinks to the kitchens. The slops and kitchen waste were collected in barrels and also carted at least a mile from the camp. One regiment, the One hundred and sixty-first Indiana, provided itself with an old railroad engine boiler and attempted to dispose of the kitchen garbage by cremation. While this was a step in the right direction I always doubted its thoroughness, since it was only possible to dispose of the solids in this way, the watery portions of the slops being carted away. On the 11th of June I suggested a cesspool for the disposal of the urine and strained kitchen slops in the following terms:

"I have the honor to state that the arrangement for the disposal of the urine in the various regiments of the Second Division, stationed at Camp Cuba Libre, have proven unsatisfactory. At present the men urinate in the corners of the superstructure which surround the sinks, thus saturating the ground, causing a very disagreeable odor and an unhealthy condition. Many of the men urinate in the tubs prepared for defecation, thus rendering their contents difficult of cremation.

"Three methods have suggested themselves for the disposal of the urine, and I would respectfully request that each be given a fair trial in one regiment. First, that two half barrels, filled with sawdust, be conveniently located for the use of one battalion, which shall be emptied twice daily and the contents cremated. Second, that a pit 6 feet deep be dug for one battalion, provided with a trough lined with zinc; the pit to be disinfected twice daily with a solution of sulphate of iron. Third, that a cesspool 6 feet deep be arranged by using an empty barrel or dry-goods box for one battalion, properly provided with a trough lined with zinc and a suitable conducting pipe. This also to be disinfected twice daily with a proper solution of sulphate of iron. There are but two ways by which urine can be disposed of in camp, viz, by local absorption or transportation. The latter method would be more efficient and sanitary. If the tub system with sawdust prove satisfactory, I would suggest that its use be made universal while the troops are permanently located here. I believe the saturated sawdust could be easily disposed of by cremation. There is some question as to the disposal of this secretion by local absorption, owing to the large quantity secreted daily. Of course, a large amount of this is deposited beyond the confines of camp. In this connection I would also state that the scavengers experience great difficulty in passing the sentries. I would suggest that definite instructions be given, so that these men can have access to the sinks at all hours of the day."

Owing to the fact that water was usually found at a depth of from 4 to 6 feet in all of the camps at Jacksonville, it was not largely put into practice. I believe that under ordinary circumstances it would prove a very satisfactory method for the disposal of these two troublesome factors in camp sanitation. The following letter was written June 26, 1898, to the corps commander on the subject:

"I have the honor to state that on June 11, I made a general recommendation to the commanding general of the corps for the disposal of the urine and kitchen slops. My recommendation at that time was to the effect that cesspools 6 feet deep should be arranged for the use of each battalion, properly supplied with connecting pipes, suitable troughs for the collection of the urine, and a hopper for the kitchen slops, protected by a strainer. It appears that an experiment was attempted in one of the battalions of the Second New Jersey, but owing to the fact that water was discovered at a depth of about 6 feet below the surface the attempt was abandoned. Since that date I have caused to be constructed in the ambulance companies a cesspool on the plan laid down in my recommendation of the 11th and 26th ultimo, which was carried out by First Lieut. J. G. Byrne, who is in command of the Second Division ambulance company. My plans were somewhat modified, and are as follows: A shaft was dug 6 feet deep, and about 5 feet square. At the bottom of this shaft was placed a crib of pine logs extending up about 4 feet from the bottom of the shaft, covered with pine brush, and then filled in with earth, the conducting pipes lead off from this shaft to the faucets, kitchen, and other low places where drainage was needed.

"Lieutenant Byrne informs me that at the depth of 6 feet he struck quite supply of water, but that notwithstanding this fact he carried out my idea, and I am happy to say that the surplus water and slops from the kitchens have been carried off perfectly, and the camp in that section is kept dry. This cesspool works admirably, and I believe that it is ideal for the disposal of kitchen slops and urine in this camp. I would therefore very strongly recommend that such instructions be given at once for the construction of cesspools in all of the regiments for the disposal of the urine and kitchen slops as originally recommended in my communication on this subject during the month of June.

"I would suggest that a cesspool be constructed adjacent to each sink for the disposal of urine, and one adjacent to each kitchen for the disposal of the kitchen slops."

The following special letters of instructions were issued to the medical officers of the corps during the summer; the first was dated June 8, the second June 10, and the third September 22, 1898:

1. "Medical officers will carefully inspect regimental sinks and latrines daily.

They will see that the fecal matter is carted away twice daily where tubs are used for this purpose, and that the latter are carefully washed and limed before they are returned. Lime will also be liberally used about the sinks and latrines. Where pits are used, the deposits will be sprinkled with lime, and afterwards well covered with earth. Division quartermasters will supply quicklime for this purpose."

2. "Circular No. 1, War Department, Surgeon-General's Office. Washington, D. C., April 25, 1898, is hereby furnished for your guidance in the care of the sanitation of your camp. A strict compliance, as far as practicable, with the recommendations embodied in this circular is required."

3. "The regimental surgeons are requested to make such recommendations to the colonels of their regiments as are necessary for the care of regimental sinks. There should be an order issued in each regiment where the pit system is used, that each individual should cover his own dejecta at once before leaving the sink, and that a sentry should be posted at each sink to see that this procedure has been carried out.

"Where the tub system is used, regimental surgeons should see that the dejecta are thoroughly covered with lime immediately, and the sentry should also be stationed there to see that this procedure is carried out.

"Owing to the prevalence of typhoid fever in the various regimental camps, it is incumbent upon every regimental surgeon to see that the greatest precautions are taken to prevent the dissemination of this infection by means of flies."

The following letter, which was written to the adjutant-general of the corps October 26, will explain the method employed for the disposal of the feces, urine, and slops, for the troops at Savannah, Ga. The provisions of this letter were practically carried out in every particular.

"In compliance with verbal instructions from the corps commander, I have the honor to submit the following recommendations for the disposal of the excreta of the troops of this command:

"That a sink be erected for the disposal of the night soil for each battalion and independent organization, of sufficient dimensions, on the dry-earth system, and that sawdust and unslaked lime be used in the place of earth: that these superstructures be built of rough lumber, about 40 feet long, 8 feet wide, and 6½ feet high, with a shed roof, and provided with a seating capacity of twenty men, well closed in, and with falling lids over the holes; that the dejecta be passed into drawers, which are likewise to be provided with falling lids in the rear, admitting of the withdrawal of the night soil and their thorough cleansing. The boxes for the reception of the fecal matter should be made of pine lumber, tightly caulked and coated on the inside with pitch. The night soil should be emptied into turpentine barrels with gasket covers, or some similar device, and should be carted away twice daily to some convenient place one mile distant from camp, where they can be thoroughly cleaned and washed. The care of the regimental sinks should be under the control of the regimental commanders, and subject to twice daily inspections by the regimental surgeons.

"The urine should be disposed of by cesspools adjoining the sinks. The pit should be 6 feet deep and 6 feet square, if possible, covered 1 foot from the top with heavy joists and a layer of earth. These cesspools should be provided with a ventilating pipe 6 inches square and conducting troughs made of sheet iron, or wood lined with tin and flared. The troughs should be placed within the sink and along the side wall, which should likewise be lined with tin, and the floor should be sprinkled heavily with sawdust to catch the drippings. The slops from the kitchen should be carefully poured into turpentine barrels, provided with gasket covers, or some similar device, and carted away to a safe distance from camp. The removal of all kitchen slops and fecal matter should be done by contract, no part of it being done by soldier labor. I would recommend that a detail be made from each regiment to care for the sinks and see that the deposits are properly covered with sawdust and lime, and that a sentry be posted in the rear of each sink to see that the orders are carried out."

The pit system was employed by the corps for the disposal of the night soil and urine after its arrival in Cuba. The kitchen slops and garbage were hauled to a safe distance from the camps. I do not regard the burying of the kitchen slops as a safe method, where troops are to remain longer than one week.

The following letter was written December 29, 1898, to the adjutant-general of the corps, with reference to the occupation of forts, redoubts, etc., around Havana after the arrival of the corps in Cuba:

"I have the honor to recommend that all forts, redoubts, etc., to be occupied by the troops of the Seventh Army Corps be thoroughly inspected and disinfected by the medical inspector of the corps before occupancy, and that the temporary encampment of the guards and sentries be selected by the medical inspector before the works are ready as quarters. In this connection I would advise the organization of a special detail for the disinfection of all buildings, works, etc., to be occupied by this command, under the direction of a medical officer. This detail should be provided with the necessary wagons, disinfection brasiers, scrubbing brushes, brooms, disinfectants, etc.

"In my opinion a squad of not less than fifteen men and several noncommissioned officers should be detailed for this purpose."

Etiology of typhoid fever in Florida camps.—The generally established theory that typhoid fever is purely a water-borne disease is liable to serious controversy as a result of investigation on this subject during the recent Spanish-American war. It is more than probable that other causes and conditions will be found very important etiological factors in typhoid in addition to infected water, and that the poison may gain entrance into the system otherwise than through the prima via. Typhoid fever made its first appearance at Jacksonville in the Fourth Virginia, which had come directly from the State encampment, near Richmond, Va. The water supply was taken from James River, and was pronounced by the regimental surgeon, Maj. C. R. Vance, to be very bad. He also informed me that typhoid had appeared in the regiment before it left Richmond, and that one or two cases had proven fatal there. The regiment arrived at Jacksonville about June 6, and was assigned to the Second Division, which was in camp in Springfield, a suburb, within the city limits. A week or ten days later the Second Mississippi arrived from Jackson, Miss., where it had been encamped and supplied with water from a bayou connected with the Pearl River. The regiment brought with it a half dozen or more cases of typhoid fever, which the regimental surgeon mistook for continued malarial fever. I learned that the water supplied the troops at Jackson was notoriously bad, and that frequently during the summer encampments there troops suffered from typhoid. The Third Mississippi, which went to Chickamauga, suffered very severely from this disease after its arrival there. Typhoid fever also appeared in a serious form in Company F, Second Illinois, early in June. This regiment belonged to the Second Division, and had been in Jacksonville since the last of May. On the 29th of the month tainted meat was furnished this company for dinner, and as a result nearly every man in the company was shortly afterward affected with a serious attack of cholera morbus or some other form of gastro-intestinal irritation. A week or ten days passed before the men recovered from the attack, and many of them remained weak and anæmic for weeks afterward. Before the end of the month seventeen well-developed cases of typhoid fever appeared in this company, the regiment otherwise remaining free from it. I thoroughly investigated the case and found the facts as stated above.

It is believed that the successful invasion of typhoid fever in this company resulted from the gastro-intestinal irritation and general lowering of the vital functions of the men affected. It certainly seems remarkable that all of the cases of this disease were at first confined to one company in the regiment, when we consider that the surroundings and sanitary conditions of the other eleven companies were identically the same. The First Wisconsin was the next regiment in which the fever occurred. This regiment belonged to the Second Division, and was encamped on both sides of the shell road, a main thoroughfare used for driving and hauling. The scavengers also used this road for carting away the tubs, which were filled with the fecal matter. The contents of these tubs were rendered partially liquid by the admixture of urine, and there can be no doubt but that a considerable portion of their contents were splashed along the road and thus became intermingled with the dust. The season was very dry in Jacksonville until July, and the roads very dusty, and it seems very probable that the infection was conveyed by the dust while the men were resting or sleeping in their tents. This seems the more probable when we consider that in the one company, which was encamped on both sides of the shell road, from fifteen to twenty cases appeared, while the remainder of the regiment at this time was practically free from it.

The water system of Jacksonville was furnished from an artesian well, driven from 800 to 1,000 feet below the earth surface. The water as it emerges from the earth is saturated with sulphureted hydrogen gas, but is otherwise pure and delightful. Before the water is pumped into the water tank for distribution to the city, it passes through an evaporating tank, where the sulphureted hydrogen gas escapes. This water was liberally supplied to every organization in the Seventh Army Corps by a system of piping. It is not possible that enteric fever among the troops at Jacksonville could have been contracted from this water. Unfortunately, around the suburbs of the city, which was infested by the negro and lower element, driven and surface wells were located by the hundreds, nay thousands. Every shanty around the town was provided with such a well, located within a few feet of the privy, which consisted of a wooden superstructure located over a pit containing the undisturbed collection of years. It is unnecessary to add that the use of lime or carbolic acid in connection with these sinks never occurred to owners of these premises. When one considers that water was reached within 5 or 6 feet of the surface, over the entire valley in which the city of Jacksonville is located, the question of well infection is hardly worth disputing. The summer of 1898 in Jacksonville was unusually hot, and the use of water for drinking purposes constant by everyone. Anyone who understands the restless and investigating nature of the volunteer soldier when not on duty, can readily imagine the frequency of visits to the various habitations in the vicinity of his camp. I am sure none of these shacks escaped frequent visits and these wells a liberal patronage. Besides, the well water was several degrees cooler, and hence more palatable than that furnished by the hydrant. The soldiers, when off duty, made frequent excursions into the country, provided with canteens, which were generally filled from these surface wells. All of the dairies were located in the suburbs of the city beyond the city water supply system. It is fair to presume that the milk cans were rinsed with water taken from these wells, and the milk to some extent adulterated by the same agency. The following letter was written August 16, 1898, to the adjutant-general of the corps with reference to the milk supply:

"I have the honor to state that it is very possible that a large percentage of the cases of typhoid fever which have developed in this corps have resulted from the use of milk. It is scientifically known that milk is one of the very best media for the culture of the typhoid bacillus. Nearly all of the dairies which furnish milk to Jacksonville are located at some distance from the city and beyond the city water supply.

"I have been informed that many of these dairymen use water from the open or driven wells on their premises and rinse their cans in this water. I understand also that in some instances the milk has been diluted by the milkman. Many cases of typhoid fever have been directly traceable to an infected milk supply, and I believe it, therefore, for the best interest of the service to exercise the utmost vigilance in regard to the examination of milk furnished each regiment. I would therefore recommend that a medical officer be detailed from each regiment to inspect the milk supply and premises from which it is obtained, the water used in washing out the cans, and to see whether the milk has been diluted or not."

On an inspecting tour to the First Division, stationed at Miami, Fla., early in July, I found about fifty cases of fever undergoing treatment in the division hospital, which were variously designated as remittent, continued malarial, etc. These cases were in reality different grades of typhoid fever, which apparently had resulted from the use of water taken from driven wells. The troops there were supplied with water from two sources, one from wells driven 10 or 15 feet through a very porous coraline rock formation, the other from the everglades, through the city water system. Samples were collected from half a dozen wells in the camp and from one of the city hydrants and sent to Washington for analysis. Specimen had previously been sent to the State chemist and bacteriologist of Louisiana, also for investigation. The analyses were practically the same from each laboratory, the water being pronounced in both cases as entirely unfit for use. The following is an extract from a letter to the adjutant-general of the corps on this subject, after my return, July 16:

"The water supply for the troops is derived from two sources, driven wells and city water.

"About fifteen wells have been driven for each regiment to the depth of from 18 to 21 feet below the surface. I find this water to be quite turbid, containing a large earthy deposit which quickly settles to the bottom of a vessel. It has a disagreeable taste and an offensive odor, and in my opinion contains a large percentage of organic and vegetable matter. The source of this water, in my opinion, is from surface drainage. The other water supply consists of water piped to the camp from the city system, which comes from an open lake in the everglades, about 4 miles distant. This water supply was highly colored during my visit, offensive in taste, and possessed a disagreeable odor. The Miami people claim that the everglade water is wholesome. This may be the case in winter, but is very questionable during the summer, which is the rainy season. The basin from which the everglade water is taken is grown up with tall grass and rank vegetation, and is a natural drainage for a large territory containing tropical growth. The high color of this water was unquestionably due to the recent rains.

"The percentage of sick in this command was unusually large, there being about one hundred men regularly on the sick report undergoing treatment in each regiment, and as many more complaining, but not on sick report. I found that a large number of these cases consisted of diarrhea, dysentery, and a low form of fever, probably malarial in nature. There is a universal opinion on the part of officers and men of that command that the water supply is the cause of all the illness, and in a number of instances I found that they had abstained from its use, relying upon tea, coffee, or boiled water. Owing to exposure to the sun's rays the everglade water is much warmer than that from the driven wells, and consequently the men have been using the latter very largely. A number of the company commanders had ordered the pump handles to be taken off. I selected a specimen from a driven well in each regiment and one from the city system, also one from a spring about 400 yards west of the camp, which have been forwarded to Washington for analysis. I believe the result of this analysis will prove that a large percentage of the sickness there is due to the water supply."

One of the most fertile sources of gastro-intestinal disturbances among the troops of the Seventh Corps resulted from the free use of soft drinks, pies, cakes, candies, watermelons, and other unripe and stale fruit which were being vended and consumed throughout the camp during the summer. When not on duty the men were constantly drinking or eating between meals articles of this class, and as the lemonade, etc., were made and sold by the negro element, it is fair to suppose that the water used for its manufacture was taken from infected wells. Upon questioning these vendors, I found they used the well water; for the reason that it was more convenient and besides left no taste of sulphur which the hydrant water was liable at times to do. In addition to the peripatetic peddler, the principal roads leading to and running through the camps were literally lined with booths, restaurants, and shops of all kinds, the surroundings of which, as a rule, were filthy and unsanitary. A letter was written to the adjutant-general of the corps on this subject, and resulted in the following order, issued July 26, 1898:

"Reports having been made by the chief surgeon of this corps that there are many booths or shops in the vicinity of regimental camps that do not preserve proper police and sanitary regulations, the division commanders will cause frequent inspections of these places to be made and will require a strict compliance therewith, and also that all articles sold from such places are fresh and wholesome. In cases of noncompliance, after proper warning, the necessary legal steps will be taken to have such booths removed, and in the interim no soldiers will be allowed to enter them, necessary guards being posted in the vicinity for this purpose. Peddlers and vendors of lemonade, pies, etc., will not be allowed to enter the regimental camps, the soft drinks furnished by them being in many instances stale and generally productive of sickness. All enlisted men will be forbidden to drink any water except from city pipes. If they are on duty which takes them from the camp canteens properly filled before starting will be taken. The health of an organization depends largely upon the efficiency of its company officers in their enforcement of simple sanitary rules. Regimental surgeons will report any infraction of sanitary laws to the regimental commanders, upon whom devolves the responsibility of their proper enforcement."

Since a large number of ambulant typhoid fever cases were treated in quarters for malarial fever and diarrhea there can be no doubt that many of these men not only infected the sinks and latrines but fouled the grounds around their regiments. Besides, it is probable that not a few of the men thus affected assisted in the kitchens and mess rooms, and infected the food and dishes served to their comrades. Unfortunately, few of the men in the field washed their hands after leaving the water-closets, and it is more than probable that the poison in some instances was directly transmitted in this way. As was to be expected, the young men suffered more from typhoid than the older ones. It was also observed that the Southern regiments enjoyed a greater immunity than those from the North. The question of heat and exposure to the sun may also be discussed as an etiological factor in typhoid fever. Men accustomed to exposure to the sun and heat of the Southern climate are less liable to contract typhoid fever than Northern men, sent to the South during the summer months. As a rule typhoid fever occurs during the hot months, and disappears as cold weather approaches. From a long experience with troops in the South I have observed that the newcomer was more liable to contract fever than an old resident or native born, and hence a partial immunity as a result of acclimatization is obtained.

Toward the latter part of June the common household fly made its appearance in great numbers. They congregated especially in the vicinity of the kitchens, mess rooms, sinks, and urinals. They swarmed back and forth from sinks to kitchens, and at times fairly covered up the food, prepared and unprepared. As the tubs containing fecal matter were being carted away, they left a trail of flies through the camp, whose feet were no doubt fouled with feces. The possibility of typhoid infection by means of flies was understood, but it seemed almost impossible under the circumstances to avoid it. Flies were found everywhere in great abundance, and annoyed patients in hospitals as well. Recognizing the importance of food protection, the following letter was written September 1, 1898, to the corps commander in regard to the protection of mess rooms:

"I have the honor to request that the regimental quartermasters be authorized to have their company mess rooms provided with wire-woven screens in order to keep out the flies which infest the camp. I believe that flies may be the means of carrying infection to the mess rooms, and that proper wire screens will prevent this."

Many of the hospital tents were protected from the flies by means of mosquito nets or wire gauze. A number of the hospital tents were entirely screened in this way, the ends and sides being perfectly protected. The mosquito nets proved objectionable as a rule to the patients, the majority preferring flies to interference with the free circulation of air. Mosquito nets were supplied for every cot, but were rarely used. Maj. W. S. Bryant, brigade surgeon, Second Brigade, Second Division, did considerable work in trying to discover some chemical agency for preventing the accumulation of flies around sinks, and submitted a report to me on the subject, which was published for the information of medical officers:

"I have the honor to forward to you the results of some experiments with certain substances with a view to determine their relative efficiency in repelling flies.

"Quick lime, carbolic acid, crude carbolic acid, tricresol, and carbon water, a waste product from the gas house, were tried; no formaldehyde or creolin could be obtained.

"The most effective of these proved to be the carbon water, for 3 ounces of this placed in a sink tub where there were swarms of files was enough not only to drive the files out, but also to keep them away.

"Of the clear preparations, solutions of tricresol gave better results than solutions of pure carbolic acid. From the standpoint of expense carbon water is far superior to the others, for in this locality it has no market value, and the gas company was put to some expense in carting it away from their works.

"To recapitulate: A solution of tricresol is the best protection against files when there is danger of soiling anything, while carbon water is the best and cheapest substance for general sanitary use; but in the sink tubs it is used best without water, 3 or 4 ounces three times a day, and wood work can be painted with it to advantage also."

I do not believe the carbon water recommended by Major Bryant was largely tried by the medical officers of the corps.

Excessive indulgence in alcoholic drinks during the summer months was one of the most fertile sources of gastro-intestinal disturbances, so prevalent in the corps at this season. The excitement incident to army life, together with absence of home environment and its influences, led many of the men to indulge freely in whisky, beer, and other concoctions who otherwise were of temperate habits. As a matter of fact, an irregular habit of eating accompanied the drinking, and the men could be seen at all times during the day and night eating fruits, sandwiches, confections, peanuts, watermelons, and at the same time imbibing largely of soft drinks, such as lemonade, ginger ales, strawberryades,. etc. On every hand peddlers and venders of such wares were to be found. The saloons of Jacksonville did a thriving business during the presence of the Seventh Army Corps, and at the expense of the men's health. The use of alcohol in the tropics is of itself a sufficient cause for gastric and hepatic derangement to the unacclimated, without taking into consideration the disturbances liable to result from camp cooking and the irregular eating, so common among the volunteer troops, who have but recently been called out. To such an extent did the habit of drinking exist that I felt it necessary to have some official action taken in regard to the matter and forwarded the following letter to the Adjutant-General of the corps August 18:

"I have the honor to state that there are a large number of cases of alcoholism reported by the provost from day to day. I would recommend that a circular be issued instructing regimental commanders to recommend for discharge on surgeon's certificate of disability all cases of chronic alcoholism in their regiments.

"I believe that a circular of this effect would have a deterring effect on the whisky-drinking element.

"The certificate of disability should state that these men are discharged on account of chronic alcoholism, a disease not incurred in line of duty."

As a result of this action 48 men were discharged from the service on account of chronic alcoholism. After the arrival of the corps in Cuba intemperance gradually increased among the men, and, owing to the character of their drinks, a number of fatalities during sprees. In a letter to the corps commander, dated January 15, I recommended the establishment of canteens for each regiment, which I believe to be somewhat of a safeguard to the troops in regard to the use of alcohol:

"I have the honor to recommend that the regiments and independent organizations of this command be authorized to establish canteens for the sale of lunches, articles of daily use, beer and light wines, etc.

"I have been informed that a number of the soldiers are in the habit of drinking the alcoholic drinks of the country, which are dangerous and unsafe for American soldiers.

"One death occurred yesterday from this cause in the First Texas Regiment, and two other men were reported in a dying condition from delirium tremens.

"The rum, agua ardiente, red wine, and other alcoholic beverages sold to our soldiers, illicitly or otherwise, produce intoxication very rapidly. It is believed that canteens as suggested above would in part remedy this evil."

After a careful consideration of the propagation and spread of typhoid fever in our Southern camps, the following agents and conditions may be mentioned as very probable factors: (1) Imported infection; (2) infected well water; (3) infected milk supply; (4) infected dust; (5) infection through flies; (6) infection of food from hands of persons affected with the disease; (7) sink and latrine infection; (8) infection from fouling the camp grounds; (9) lack of acclimatization of troops; (10) filthy sanitary surroundings; (11) dissemination of infection from soiled water-closet paper by wind; (12) gastro-intestinal irritation, resulting from irregular living, camp cooking, dissipation in drinking and eating; (13) lowering of the vital functions by fatigue, exposure to the sun, and other causes incident to camp life.

Typhoid v. continued malarial fever.—The common error of mistaking typhoid for continued malarial fever was general among the volunteer surgeons during the early summer, and, indeed, many of the regimental surgeons hesitated to diagnosticate cases as typhoid as late as September, unless the prominent symptoms, such as the eruption, intestinal hemorrhage, brown tongue, sordes, and muttering delirium were present. They did not seem to realize that typhoid fever could exist in a light or moderate form. This mistake was also made in division hospitals as well, and as a result I greatly fear that the war statistics in regard to these two classes of fever will be far from correct. Fortunately, the medical officers recognized the difference between these two classes of fever before the severity of the typhoid-fever season, and it is fair to presume that the diagnoses after August 1, approximated correctness. From an extensive experience with practitioners in various sections of the country, I have found this to be a common error, and believe it due partly to faulty teaching at medical schools and partly from erroneous ideas obtained from text-books.

On a trip of inspection early in July to the first division of the corps, which was stationed at Miami, Fla., I encountered fifty cases of continued fever in the division hospital, only eight of which were diagnosticated as typhoid, the remainder as continued or remittent malarial. I freely expressed my opinion to the medical staff. The following day the diagnoses of all these cases were changed to typhoid. In my opinion it is very unusual to find a camp fever which runs several weeks or more unless it be typhoid. A board was convened, consisting of three medical officers, for the purpose of investigating and reporting upon the causation and character of the fevers undergoing treatment in the First Division Hospital at Miami. A report was returned to the effect that they were all enteric, which was forwarded to the Surgeon-General. Acting Asst. Surg. James Carroll, U. S. A., who was sent to Jacksonville about September 6 for the purpose of investigating these fevers, found the malarial parasite in about only 2 per cent of the cases examined in the various division hospitals. He visited the various hospitals in the corps and made over one hundred blood examinations, with the results as given above.

Vaccination of the Seventh Army Corps.—Directions were given to medical officers for the vaccination of their respective regiments and commands early in June. Glycerinized virus was obtained from the Surgeon-General of the Army for this purpose. The following circular letter was issued June 11, 1898, to medical officers on this subject:

"Regimental surgeons will make an examination of their respective regiments and report to this office not later than the 15th instant the number of officers and men requiring vaccination and revaccination. Those not possessing evidence of a successful vaccination during the past seven years will be considered not protected. Glycerinized lymph will be furnished by the chief surgeon of the corps.

"In vaccinating with the glycerinized lymph, do not permit the metal scarifier to come in contact with the lymph, but rub in with a toothpick and expose the arm until dry. The glycerinized lymph takes longer to dry than the other form of vaccination."

The corps was vaccinated thoroughly after its arrival in Cuba, a number of men having joined since last vaccination. Only four cases of smallpox occurred during the existence of the corps, and these men were recruits who either had escaped vaccination or it had been improperly performed.

Preparations for the transfer of the Seventh Army Corps from Savannah, Ga., to Cuba.—A month or more before the transfer of the Seventh Army Corps to Cuba the fact had become very generally known to the officers and troops. As chief surgeon of the corps, I appreciated the necessity for making preparations in advance of its arrival in Cuba, and submitted the following letter to the corps commander November 5, 1898:

“From reliable authority I learn that the Seventh Army Corps has been ordered to take station in Havana, Cuba, and that the corps commander has been advised to make timely arrangements for the necessary hospitals, which should be provided in advance of the arrival of the troops. In consideration of the fact that at least two or three weeks are required to make the proper arrangements for the division hospitals, and the necessary sinks for the use of the regiments, I would recommend that a medical officer and a quartermaster be ordered to proceed to Havana, Cuba, in advance, authorized to make the necessary expenditures for this work and to have it done.

Since these camps will be more or less permanent around Havana, I would recommend that suitable pavilion hospitals be put up for the use of the sick there, similar to the ones in Jacksonville, Fla.; also, other necessary buildings in connection with these hospitals, such as kitchens, messrooms, storerooms, icehouses, disinfection rooms, operation rooms, and sinks. I would also recommend that the necessary lumber be shipped from the United States to Cuba for this work, and that from 500 to 1,000 skilled and unskilled laborers be also sent there at once. When the Seventh Army Corps was ordered from Jacksonville, Fla., to Savannah, Ga., no provisions had been made for this work in advance, and we are experiencing at present a great deal of inconvenience on account of it. The contractors have been steadily at work here since the corps arrived, but so far as I can learn the dry earth system recommended is still unfinished, and the men are required to use pits, which are very unsanitary.”

At least one month of preparation is required to properly clear off the ground, dig sinks, build kitchens, mess rooms, lay water pipes, and construct tent floors, etc., besides making the necessary arrangements for the care of the sick. My communication was forwarded to Washington for action, and a board of officers, practically strangers to the corps, was sent to Cuba, several weeks in advance to carry out its instructions. The first brigade arrived about the middle of December, and went into camp on the grounds selected for these troops near the town of Quemados, about 8 miles from Havana. The remaining troops arrived by the first week in January. Nothing for the comfort of the men had been practically accomplished on the arrival of the first brigade. The sinks were exceedingly poor, and there was a great scarcity of water. One battalion of the Second Volunteer Engineers was attending to the work, but there was great difficulty in getting lumber, water pipes, etc. When I returned to the United States the last of February, many of the tents were unfloored and the sinks were very unsanitary. Fortunately the health of the troops remained very good, in spite of the poor sanitary conditions. I presume the season of the year was the cause of this immunity. The hospitals took their canvas along, which prevented much inconvenience and suffering, but which had not been contemplated in the orders transfering the corps to Cuba.

THE EIGHTH ARMY CORPS.

The regiments concentrated in May and June, 1898, near the Presidio of San Francisco, Cal., were at first designated the “Expeditionary forces to the Philippines.” Late in June the Department of the Pacific was formed, and while the troops operating in the department were called the Eighth Army Corps, those awaiting transportation to the islands became officially the independent division of this corps.

A field hospital was established for this division on the camp site known as Camp Merritt, on the northern boundary of the Golden Gate Park; but as this location was exposed to fogs and chill winds from the bay, the division was moved to the grounds of the Presidio, where some brick barrack rooms were utilized as a division hospital, their accommodations being expanded to 320 beds by the use of tent wards. The prevailing disease at this time was measles, introduced from State camps, but cases of typhoid fever were also to be found in the division hospital. On the whole, however, the health of these regiments prior to embarkation was very good. The change of site to the Presidio grounds, although prompted by the desire to get away from the fogs and damp sandy soil of Camp Merritt, was an excellent sanitary measure for lessening the rapidity of the spread of typhoid infection.

That the troops were in comparatively good condition, and that the sanitary arrangements on the transports, although hastily made, were fairly good, may be inferred from the fact that only twelve deaths occurred during the transportation across the Pacific of 22,462 officers and men, equivalent to an annual death rate of only about 5 per thousand of strength. The chief surgeon of the corps, Lieut. Col. Henry Lippincott, deputy surgeon-general, United States Army, gives an excellent summary of the conditions on these vessels in his report. (See page 124.)

On the arrival of the first transports at Cavite, the regiments went into camp at Camp Dewey, near the village of Tambo, about 4½ miles from Manila. Capt. H. E. McVay, assistant surgeon United States Army, established a hospital in two brick buildings, one in the arsenal, the other in the town. These had a capacity of 150 beds. They served an excellent purpose in receiving and caring for the sick from the various transports on their arrival at their point of debarkation, and are still in use as a post hospital for the commands on duty in the town.

When the third fleet of transports arrived about July 25, the troops were organized into one division of two brigades, but this organization became changed with the arrival of additional troops, and ultimately two divisions were formed. Prior to the formation of the divisions, a field hospital of tent wards was established at this camp by Maj. W. D. Crosby, brigade surgeon of volunteers. Subsequently, on the arrival of the Chief Surgeon of the Corps, this hospital was strengthened and assigned to one of the brigades, while a few days afterwards a hospital for the other brigade was organized and equipped under Maj. George H. Penrose, brigade surgeon of volunteers, the intention of the Chief Surgeon being to expand each of them into a division hospital when the strength of the command led to its organization into two divisions. One hundred hospital tents were on hand for the use of these hospitals, but at no time were the whole of them required for use.

An ambulance company, Capt. F. R. Keefer, assistant surgeon United States Army, in command, was formed on the arrival of the Chief Surgeon. Its personnel consisted of 3 regimental assistant surgeons, 4 hospital stewards and 50 men. These were carefully instructed n first aid and in the methods of transporting the wounded, and, in he attack on Manila, August 13, they did excellent service, all the wounded, 47 in number, being comfortably in bed in the brigade hospitals before 7 p. m. of the day of the advance. Native wagons, furnished by the Quartermaster's Department, were used instead of ambulances, as no animals strong enough to pull the latter through the heavy mud could be procured.

Four days after the fall of Manila the brigade hospitals were moved from Camp Dewey to the city and were consolidated for administrative purposes into a division hospital, which afterwards became known as he First Reserve Hospital. Another hospital, known as the Second Reserve Hospital, was opened in Ermita, and a convalescent hospital on Corregidor Island.

The First Reserve Hospital, Maj. W. D. Crosby in command, was established in buildings formerly occupied by the Spaniards as a military hospital. It was intended by them to accommodate 800 patients, but it has never been filled to that extent by us. We have had that many men in the hospital at one time, but to shelter them comfortably the buildings were reenforced by tent wards. The buildings are arranged on two sides of a rectangular inclosure, which is closed at one end by the guardhouse and at the other by the kitchens. The storehouses, laundry, morgue, etc., lie east of the main buildings, and between these and the Pasig River, while the smallpox hospital is 1,200 yards distant to the south. Much work has been done on the buildings and grounds, and the entire establishment is now in a very satisfactory condition. The wards are fairly well ventilated, and electric lights have been provided. The water-closets have been greatly improved. The old vaults were cleaned out and sealed up and metal cans substituted for them. These are carried away, cleaned, and returned to place twice daily by native laborers employed about the establishment.

The Second Reserve Hospital was opened at Ermita, September 23, 1898, by Capt. F. R. Keefer, assistant surgeon, United States Army. It is reported as being a really fine establishment. The building was erected as a seminary for young women, and for two years was used as such. It is known as the Colegio de Agostinos, or the Convent de la Asuncion. It has two stories and is handsomely finished. The grounds are ample and are neatly arranged and kept. It can accommodate 300 patients. The patients received in this hospital are, as a rule, convalescents from the First Reserve, although some are admitted from the regimental hospitals.

The Corregidor Hospital was established on the island in the mouth of the Bay of Manila, by Maj. W. O. Owen, brigade surgeon of volunteers, November 25, 1898. A few old buildings and a number of hospital tents give accommodation for about 280 patients. It is used for convalescents and has been of great benefit in many cases. Patients recovering from typhoid and malarial fevers have, as a rule, done well here, but rheumatic affections and diarrhea and dysentery, although benefited, have rarely been cured. The mean temperature from the opening of the hospital to April 5, 1899, was about 80° F.; the maximum, 82° F.; the minimum, 78° F. Water is piped from a mountain stream half a mile distant. Dry-earth closets are used for excreta, the cans being emptied and cleaned twice daily by native laborers.

After the occupation of Manila, the sick lists of the regiments increased, week by week, due chiefly to intestinal, malarial, and venereal diseases. This continued until the middle of December, when the heavy rains ceased. A notable improvement was then manifested, and on February 4, 1899, when the insurgents' attack was made, the regiments were considered to be in as good condition as when they entered the city in August, 1898. The extent to which sickness, with its attendant mortality, prevailed among the troops during the months of August, September, and October is stated in the following communication:

The SECRETARY OF WAR:

FEBRUARY 4, 1899.

SIR: A resolution of the United States Senate, January 30, 1899, calls for a statement of the percentage of our soldiers, now in the Philippine Islands, who are sick or who have been sick; of the number of deaths in our army by reason of the

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sickness caused by the climate in the said islands; and to set forth when, according to the generally accepted time, the sickly season begins in those islands.

First, as to the percentage of soldiers now in the Philippine Islands who are sick or who have been sick: The percentage in some regiments has been as high as 17, but it is believed that the average has seldom exceeded 10 per cent. General Otis, in his cablegram of February 2, 1899, states that "9 per cent of the command is now reported sick, the great majority of the cases being slight ailments."

Second, as to the number of deaths in our army by reason of the sickness caused by the climate in said islands: I have to submit that climatic diseases do not appear so far to have been attended with unusual mortality. Malarial diseases have caused no deaths. The total death rate, taken from the reports submitted by medical officers for the months July to October, inclusive, equals an annual death rate of 9.36 per thousand men. This is only slightly in excess of that which prevails in the garrisons of the United States in time of peace. The average annual rate of our army for the decade 1886–1895 was 7.12. Typhoid fever in the Philippines caused deaths equal to an annual rate of 5.16 per thousand men, or more than half of the total death rate. If the deaths from this fever (which is not a climatic disease) be excluded from consideration, the remaining mortality from all causes in the Philippines would be less than the corresponding mortality in the United States.

Here I would invite attention to the following tabulation, showing annual rates per thousand of strength, deduced from the reported experience of four months in the Philippines, as compared with the average annual rates at military stations in the United States during the ten years 1886–1895, inclusive:

	Philippines.		Garrisons in United States, 1886–1895.	
	Admission rate.	Death rate.	Admission rate.	Death rate.
Total diseases and injuries	3,016	9.36	1,254	7.12
Injuries	108	1.80	248	2.28
Typhoid fever	47	5.16	6	.64
Malarial fevers	370	....	96	.14
Venereal diseases	82	.48	76	.02
Diarrheal diseases	445	.48	116	.13
Bronchitis and influenza	66	.36	101	.02

From these figures it will be seen that the admission rate in Manila has been comparatively large, due mainly to malarial diseases which are climatic and to diarrheal diseases which are no doubt in large part due to errors and irregularities of diet on the part of the affected individuals. The malarial diseases exceed their prevalence in the United States in the proportion of 370 to 96, and the diarrheal diseases in the proportion of 445 to 116, or about 4 to 1 in both instances. Notwithstanding that venereal diseases have been slightly in excess, being equal to an annual rate of 82 per 1,000 men, there is reason to believe that this reported rate does not express the extent of the prevalence of these diseases among the troops in Manila. See appended extract from a report by Maj. Samuel O. Potter, chief surgeon of one of the brigades in which it is stated that although during the week ending December 3, 1898, venereal diseases caused one-fourth of the total number of admissions to sick report, it is believed that there was actually a much greater prevalence of these diseases. Injuries, notwithstanding 127 cases of wounds received at Cavite and Manila, give a smaller rate of admissions than is ordinarily found among United States troops in their home garrisons; and the death rate from accidents and injuries is less than in these garrisons, notwithstanding the fatal ending of 8 of the 127 cases of battle casualties. Diseases of the respiratory organs, which are to a large extent climatic, are, so far as reported, less prevalent in Manila than in the United States.

Reports of sick and wounded of dates later than October have not as yet been received, but recent sanitary reports show the prevalence of smallpox in several of the regiments, with a relatively high death rate from the disease. Climate is not responsible for this outbreak, which ought speedily to be suppressed by vaccination, isolation, disinfection, and other sanitary measures.

Lastly, as to when the sickly season begins in the Philippines: The experience of our troops gives no information on this subject. The generally accepted view is that in March, April, and May fevers are of more frequent occurrence than at other periods of the year.

GEO. M. STERNBERG,
Surgeon-General, United States Army.

The troops were at first quartered in various places in and around the city. Spanish barracks, warehouses, public buildings, and private houses were utilized for this purpose. Most of the buildings occupied are represented in the reports as having been in an extremely insanitary condition, this being especially true of the barracks formerly occupied by Spanish troops. An immense amount of labor was performed in cleaning up these places and their vicinity. As quickly as the necessary arrangements could be made, other and better quarters were procured instead of those which were most crowded and undesirable.

The character of the quarters occupied by the Second Division and the sanitary conditions affecting them may be gathered from two of the regular semimonthly inspection reports rendered by Maj. Samuel O. L. Potter, of the Second Brigade. One is dated October 16, the other December 17, 1898. The conditions in the First Division prior to the beginning of active hostilities, on February 4, 1899, are shown in a report by Maj. H. C. Cardwell, United States Volunteers, chief surgeon:

Major Potter's Report, October 16, 1898.

First Colorado Infantry.—There has been a steady increase of sickness in this regiment since the 1st instant, the percentage of sick to total strength having risen from 9 on October 1 to 15 on October 15. Intestinal and malarial cases form more than two-thirds of the total sick. The regiment has only 4 cases of typhoid fever and no variola. There is nothing especially insanitary about the quarters occupied. The heaviest sick list occurs in companies recruited in large cities and the smallest number in the companies from small towns and mining camps. The food seems to disagree with many of the men. I would recommend that this regiment be furnished with 100 feet of hose for flushing the banks of the estero immediately behind the quarters, on the south side of the Plaza Santa Ana.

First Nebraska Infantry.—This regiment has had a large sick report, which is now 17 per cent of the total strength. However, 95 cases are reported "no diagnosis, probably nostalgia," by the regimental surgeon. Eliminating these, the percentage of actual sick to total present strength is only 6.5. The quarters on the Calle San Fernando, occupied by six companies of this regiment, are dismal, dirty, and crowded, two-thirds of the men sleeping on the ground floor. If possible, other quarters should be obtained, but if the present building is to continue to be occupied, a floor should be constructed 4 feet above the ground, and also another floor on the level of the galleries. These quarters need latrines in greater number, to accommodate the large number of men, and more shower baths.

Tenth Pennsylvania Infantry.—The quarters occupied by this regiment are very much overcrowded. The officers are sleeping in cots, close alongside each other, like enlisted men, without privacy. The colonel has only one small room to serve for both office and sleeping room. The lieutenant-colonel has no quarters at the regimental headquarters. This regiment should be provided with more quarters, or with double-tier bunks if it is to remain in its present condition.

Intestinal and malarial diseases constitute the bulk of the sickness, there being only 4 cases of typhoid fever in the regiment. The percentage of sick to total present strength has been 12 to 13 during the last three weeks. One case of variola occurred recently in this command. The patient was at once tranferred to hospital, and the quarters were promptly disinfected. The latrines used at the building occupied by the regimental headquarters, etc., were complained of September 25, and were cleaned out by the quartermaster's department October 10.

The bread furnished to this regiment is complained of as heavy and indigestible.

Eighteenth United States Infantry.—The percentage of sick has varied from 7 to 9 since October 1, the cases being chiefly intestinal, malarial, and typhoid. Two cases of variola appeared recently in this command. The quarters were promptly and thoroughly disinfected. The sanitary condition of the quarters is good, but the vicinity of a large and dirty public market, in which variola is known to exist, is dangerous. Steps have been taken to prevent the men from frequenting this place.

Third United States Artillery.—Two batteries of this organization have recently been moved from very insanitary quarters to the Cuartel de Meisic, where the quarters, although somewhat crowded, are in a good sanitary condition. The

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officers' quarters are very crowded, but steps are being taken to secure another house for them in the vicinity.

Kitchen refuse and other slops from this Cuartel have been dumped on vacant ground in the vicinity of the quarters. This has been stopped, and instructions have been given to burn all such material which is capable of being so disposed of, and to place the rest in barrels on the bank of the canal, near the bridge, for removal by scow.

One case of variola appeared recently in this command. The quarters were thoroughly disinfected as soon as possible after the removal of the patient. The percentage of sickness to total strength has varied from 6 to 9 since October 1, intestinal and malarial affections constituting the principal part thereof.

UTAH LIGHT ARTILLERY.—This command also occupies the Cuartel de Meisic, and has had the lightest sick report in the brigade, the percentage varying from 3 to 5. The sanitary condition of the quarters is good, and the men appear contented and cheerful. Acting Asst. Surg. P. S. Kellogg gives very close attention to the sanitation of his men, and to this fact is due a large share of the healthy condition of the command.

In the whole brigade the percentage of sickness to total strength present has slowly increased since October 1 from 9½ to 12⅓. Much of this is due to homesickness, which undoubtedly exists to a very considerable extent in some of the regiments. Still, intestinal affections, malaria, and typhoid fever claim a large share. Venereal disease is gradually increasing—from a total of only 9 cases on October 1 to 34 cases on the 15th. These are serious cases, for it is the custom not to take up a man on the sick report for ordinary gonorrhea or small chancroids. There is a marked absence of pulmonary disease, the few cases being ones of bronchitis or influenza, and practically no pneumonia. Rheumatism is low, but increasing. Diseases ordinarily considered air-borne are nonexistant, with the exception of variola, of which only four cases have appeared in the brigade.

Nostalgia is undoubtedly the most severe affection in the command, affecting officers as well as enlisted men. Some of the regimental medical officers are badly infected with this complaint, and such naturally sympathize with the men. The result is a sick list wholly out of proportion to the real disease present.

GENERAL RECOMMENDATIONS.—For the control of the existing malarial, typhoidal, and intestinal disease, I would respectfully submit the following recommendations:

1. That no men be quartered on the ground floor, without having a wooden floor raised 3 or 4 feet above the earth.
2. That double-tier bunks be furnished whenever desired by regimental commanders.
3. That the sale of native-made drinks and spirits of local manufacture be absolutely prohibited throughout the city.
4. That regimental commanders be required to insist on their men drinking no water except that which has been boiled.
5. That the men be forced to keep out of the poorer native houses, and that all natives of the lower class (except servants) be excluded from the quarters of the troops.
6. That laundry work be done in quarters or separate building provided for the purpose, under the supervision of regimental or company commanders.
7. That earth closets be furnished when desired by regimental commanders, and that all sinks be regularly cleaned by contractors employed by the Quartermaster's Department.

Remarks of Brig. Gen. Irving Hale, United States Volunteers, commanding, on the above report:

Respectfully forwarded to Surgeon-General United States Army, through military channels.

Frequent inspections have been ordered and made during the month with reference to various matters, and especially to determine cause of increase in sickness, resulting in recommendations summarized in this report, which have been carried out as far as possible.

Requisition from the Colorado regiment for hose was forwarded some time ago.

The question of quarters for the Nebraska regiment has been thoroughly canvassed, and report forwarded with recommendations for improving some of the quarters now occupied and securing others.

The same remark applies to the Tenth Pennsylvania Regiment.

A special report on bread furnished by the Subsistence Department has been made by the brigade surgeon, and forwarded to the commissary for investigation and report, with the view of improving the quality of the bread.

Referring to general recommendations at end of report, Nos. 1, 4, and 5 have been carried out as far as possible. Nos. 2, 3, and 7 require action of higher authority, and are strongly recommended.

The question of regimental laundries mentioned in recommendation No. 6 has been under discussion for some time, and steps are being taken in that direction.

MAJOR POTTER'S REPORT, DECEMBER 17, 1898.

FIRST COLORADO INFANTRY.—Since my last sanitary report the rains have ceased and the grounds in the vicinity of the quarters reveal their true condition, being no longer soaked generally with water. Those on the north and east side of the San Sebastian Church are not in sanitary condition. From Company G's kitchen there descends a stream of dirty water which forms a pool of muck at the foot of the wall. There are several old cisterns in these grounds which require attention. One should be pumped out: another (a dry one) should be cleaned out and covered, so that refuse will not be thrown into it, and the green plant on the surface of the irrigating cistern in the garden should be raked off. The sinks here are badly cared for and require some improvement. The men using them expose their persons to the gaze of women who pass by in the field and paths behind the sinks. Some slight bamboo shelters or screens, built around and as a roof, would make a great improvement in the decency of the place and the self-respect of the men compelled to use it.

The new sinks built recently for the quarters on the Plaza Santa Ana are not kept in clean condition. The companies at Nos. 20 and 66 Calle Alix need sinks badly, and when built they should follow the plan of the one at No. 46 Calle Alix, which is flush inside, has neither string-pieces nor cross-pieces to catch excrement and urine and bring a swarm of poison-bearing flies into close proximity with the men's bodies.

The bread baked in this regiment is of excellent quality and the other food is well prepared.

The sick report has fallen during the past week from 15 to 13 per cent. Intestinal, malarial, and venereal disease constitute over one-half the total sickness. The regiment has only 2 cases of typhoid fever and 1 of variola, and has no other infectious disease.

FIRST SOUTH DAKOTA INFANTRY.—The two houses on the Calle Solano occupied by this regiment are in good sanitary condition both inside and outside, and reflect much credit on the battalion commanders in charge of them. The quarters at the Malacanan Palace are but slightly improved inside. Some whitewashing has been done, but this work has stopped short of completion. It should be continued, after brushing down and scraping the walls of all the quarters. I renew my recommendations in previous reports, that raised floors be put into these quarters and that gravel be deposited on the grounds in their immediate vicinity.

The sick report of this regiment shows a decrease during the last week from 14.5 to less than 12 per cent, malarial and venereal disorders constituting the chief diseases. The only cases of infectious disease are 1 of typhoid fever and 3 of parotitis. The food is good in quality and is fairly well prepared.

FIRST NEBRASKA INFANTRY.—The camp of this regiment has been located recently and is not yet in complete condition. It is on the highest ground attainable, and has an ample water supply, piped in from the main pipe which supplies the city. The trenches dug around the tents are deep enough for the purpose, but those in the lines of the company streets are too shallow to be of much service. The sinks are not deep enough, and kitchen refuse is not all hauled away or burnt, some of it being in plain evidence on the ground in the vicinity of the kitchens.

The sick report of this regiment on this date shows 8.3 per cent, of which 5 per cent is in quarters. The decrease is largely due to discharge of men on sick report as part of the recent reduction of the regiment to 80 men per company. Malarial and venereal diseases are the chief affections. There is no infectious disease in the regiment.

In the brigade, as a whole, there are 358 cases on the sick report, being 11 per cent of the total present strength, a decrease of 4 per cent since my last report. The number of cases by diseases is as follows:

Intestinal	45	Pemphigus	10
Malarial	94	Vaccinia	9
Venereal	89	Typhoid fever	3
Rheumatism	18	Parotitis	3
Pulmonary	13	Variola	1
Slight injuries and sores	23	All others	50

GENERAL REMARKS.—In most of the quarters I find considerable neglect of thorough cleaning, especially of the floors, ledges, and high bunks. A large quantity of dust is permitted to remain in out-of-the-way places, on projecting ledges, and other places which are not very easy of access. This dust will form breeding places for germs of disease if not removed. There is also a general want of order in the arrangement of blankets, shoes, and clothing. This may be a slight matter from a sanitary point of view, but it indicates the general habits of the men as to carelessness about details, and if not corrected will result in equal carelessness in regard to cleanliness of the person and surroundings.

With the end of the wet season the command is now exposed to the influence of a hot sun upon a soil rich in organic material, as also to the prevailing dust of the streets. Greater care than ever is therefore incumbent upon all commanding officers in regard to the sanitary condition of the quarters and the grounds in their vicinity.

Remarks of Brig. Gen. Irving Hale, United States Volunteers, commanding, on the above report:

Respectfully forwarded to the Adjutant-General, Second Division, Eighth Army Corps, approved.

The attention of regimental commanders has been called to the portions of this report affecting their respective commands, with instructions to take the necessary steps to remedy defects mentioned and report action thereon.

The general showing in regard to decrease in sickness in all of the regiments of the brigade is encouraging, especially with reference to venereal disease, which steadily increased to 113 cases on December 10, but had decreased on December 17 to 89, and intestinal troubles, which have decreased from 65 on December 3 to 45 on December 17. (See report of December 3 for tabulated statement of diseases for preceding month.) Part of this decrease is due to return of sick to the United States, but there is a general improvement outside of this.

MAJOR CARDWELL'S REPORT, MARCH 18, 1899.

The grounds upon which the First Division have been quartered occupy that portion of the delta of the Pasig River at Manila which lies south of the Pasig River, and is bounded on the north by the Pasig, on the east by the Pasig River and open country ending at the Laguna del Bay, on the south by open country, and on the west by Manila Bay. On an average this ground is but 6 inches to 2 feet above the level of high tide, and through a greater portion of this part of the city we find nothing but rice or sacate fields, interspersed with dikes and showing roads from 30 to 60 feet in width built up above high-tide level, which roads are lined with the substantial buildings of this part of the city, while the marshes are flecked in spots by groups of nipa huts elevated on bamboo stilts.

This territory is cut up by esteros, which serve the useful purpose of irrigating sacate fields, but otherwise are a nuisance. Except for those houses which are situated on the river bank and a few which are on the beach, there is no drainage whatever, either for sewage or surface water, except by percolation through the soil or into the half-stagnant esteros. The majority of the house closets are simply stone vaults built up from the ground and leaking their accumulated contents of years through the porous stone and its interstices on to the surrounding ground. Kitchen and stable refuse is led by the easiest surface channel to the nearest vacant lot and allowed to spread over the ground. Up to the beginning of hostilities the sacate fields throughout this territory were frequently turned up to the air by plowing.

FIRST BRIGADE.

FIRST CALIFORNIA INFANTRY.—This organization occupied 2 barrack buildings, formerly used by the Spanish authorities. They are built of wood with stone foundations, and roofed with galvanized iron. They are named, respectively, the Cuartel de Fortin and the Cuartel de Infanteria. Both these barrack buildings are raised from the ground about a foot to 18 inches, but are boarded up about the sides so that there is but little circulation of air under the floors. They are situated on the bank of the Pasig River, and are surrounded by the open ground of the botanical garden on the other side. Both barracks are so cut up into small rooms, and the regiment was distributed through these in such a manner that it is impossible to give any figures of value as to the cubic air space allotted to each man. As a matter of fact, this is of secondary importance, as all the buildings are fitted with windows which represent nearly half the surface area of their walls, and these windows are constantly open. The space between the buildings and for a space around them is macadamized.

Part of the Cuartel de Infanteria is two stories in height, and the upper stories are used as quarters by the headquarters and staff.

Drainage, sewerage, and disposal of waste.—These buildings were fitted with what are supposed to have represented the Spanish ideal of sanitary plumbing. That is, either hopper closets, with valve traps or no traps at all, opening into short pipes discharging into the river, or holes in the floor opening over a stone or cemented ditch, also opening into the river. After thorough policing and with continuous use of large quantities of water, these arrangements have been made to answer the purposes of our troops. Waste was for a long time thrown into the river, but latterly has been collected in cans and disposed of by the sanitary department of the city.

Water supply, clothing, food supply and its preparation.—The same as described under the Fourteenth United States Infantry.

Habits of the men.—Not so good as in most of the other regiments. This regiment was stationed nearer the center of the city than the others of this division, and intemperance was probably more common. There was, since its muster in, a tendency in this regiment to neglect the policing of quarters and their surroundings. Of the four medical officers mustered in with the regiment, one soon resigned; one was sent home on a returning transport, and then resigned; one was on sick report for some time, and then resigned; leaving for a long time but one medical officer available for duty. This medical officer established at a considerable distance from the quarters of the regiment a regimental hospital on a considerable scale, outfitting it with goods received from the California Red Cross Society. After the establishment of this hospital the regimental sick list increased in numbers, and the surgeon gave most of his attention to the hospital, while the police of barracks and quarters was not looked after as closely as it should have been.

First Idaho Infantry.—All but two companies were quartered in a building formerly used as a cockpit. This building was built of nipa thatch, and had no walls. It is situated in the midst of what was a marsh, and is raised from the ground from 2 to 3 feet on posts. It was prepared for occupancy by rethatching the roof and inclosing the walls with thatch, leaving windows, which can be raised as screens and supported by sticks. These occupy so much of the wall space that the troops are practically in the open air, and cubic air space is not a problem. Connected with this building by an elevated walk is the building used for bath and closets. The kitchens are in an open shed situated about 50 feet from the barracks. The ground in front of the building is macadamized and deep ditches line the roadway. In the rear the ground, now dry, is in wet weather a morass, and can hardly be drained. The ground under the building is in the natural state, and in wet weather is very wet. The ground level is but a few inches above the tide level of a near by estero, and adjoining grounds are below it.

Drainage, sewerage, and disposal of wastes.—The bathroom has a floor of slats and twenty-four shower baths. The space underneath is cemented and all the water flows from this through two shallow cement troughs, over which the closet seats are arranged at the other end of the building. A funnel-shaped contrivance of sheet iron under each closet seat directs dejecta into the troughs, from which the bath water washes them into a stone sewer with very slight fall, emptying into an estero at a distance of about 200 yards. The system is equivalent to an open drain throughout, but with proper policing of the closets and chutes under them proves fairly satisfactory as a makeshift. Waste is deposited in cans and disposed of by the sanitary department.

Water supply, clothing, food supply and its preparation.—The same as described under the Fourteenth United States Infantry.

Habits of the men.—These were for a time very bad, as this regiment had the largest percentage of venereal diseases and results of alcoholism in the division. In my opinion a great improvement in this regard was due to the establishment of a regimental canteen, run and kept under discipline in most excellent style. Cool American beer as a substitute for the beno of the native ginshops had a most beneficent effect.

First Washington Infantry.—This regiment was distributed in several buildings, one battalion in what is popularly known as the Bishop's Palace, on Calle Nozaleda, near Paco Bridge, one battalion in a building formerly used as a tobacco factory, on Calle Marcelino, and one in a wing of the tobacco factory of the Compania General, on Calle Canonigo. The Bishop's Palace is a two-story building of brick, stone, and wood, situated in spacious and very beautiful grounds, laid out with flower beds and shrubbery. Within these grounds were several fountains and one large stone tank evidently designed for a bath, a laundry, or a duck pond. These pools were full of stagnant water covered with algæ and bubbling with the products of decomposition. No outlet could be found until the water had been dipped out in buckets. The grounds are about 18 inches above high-tide level, and directly in their rear are extensive sacate fields, which are inundated twice daily by the Estero de Paco, which is little better than a sewer. The building, although a private house, was freely ventilated, not only by many windows, but by means of spacious halls and broad staircases. The wing of the tobacco factory on Calle Canonigo was a two-story barn-like structure of wood, with plenty of room for two companies on each floor. Its objection lay in its previous occupancy by large numbers of native women cigarmakers and its probable infection through them with smallpox. Several cases developed among the soldiers in this building, in spite of repeated soakings of the floors and walls with strong solutions of corrosive sublimate and whitewashing of the walls. It is possible that the infection in this battalion was due, however, to the opportunities for association with the thousands of native employees in the remainder of the building. The companies on Calle Marcelino occupied a two-storied wooden building situated on the bank of the Canal de Baleta, and which had been previously occupied by a contractor for the sanitary department, who used the yard as a bull corral, and, to save long trips, dumped hundreds of loads of garbage on the surrounding grounds. As much as possible of this was burned and the contractor compelled to haul away as much as was offensive of the remainder. The ground is low and is part of the same marsh on which the barracks of the First Idaho Volunteers are situated.

Drainage, sewerage, and disposal of wastes.—There is no natural drainage for any of the grounds occupied by this regiment except by percolation through the soil. The sewerage system was by vaults, some of which were arranged to overflow into adjoining esteros. At present the earth-closet system is in use. Waste is deposited in cans and disposed of by the sanitary department.

Water supply, clothing, food supply and its preparation.—Are described under the Fourteenth Infantry.

Habits of the men.—This regiment arrived in the Philippines with a large number of venereal cases, and had in its ranks many hard drinkers, and with a record of lax discipline in some of its parts. The sanitary errors which would naturally follow such a condition of affairs have not yet been entirely corrected.

SECOND BRIGADE.

FOURTEENTH UNITED STATES INFANTRY.—This regiment was quartered in buildings known as the Cuartel de Malate, formerly used as Spanish barracks. The date in which they were built is not known, but they are comparatively new. The grounds, which are 320 by 480 feet, are closed by a high stone and iron fence, and have public streets on all sides. The grounds themselves are separated from the beach of Manila Bay only by Calle Real and the grounds occupied by the First North Dakota Infantry. They are sandy in character and I believe higher above high-tide level than any other barracks in this division, probably 4 feet. The buildings are of wood with galvanized-iron roofs, and are supported on wooden pillars 4 feet from the ground. The ground area directly under the buildings is cemented, and the area between the buildings is macadamized. Each barrack building shelters nearly 180 men. As the area of each is 38 by 188 feet, with 16-foot walls, and a roof without ceiling, having a height in the middle line of 8 feet, the total cubical air contents of a building is 142,880 cubic feet, or 794 cubic feet per man. Each building, however, has twenty-four windows, 4 by 8 feet, which are constantly open.

Drainage, sewerage, and disposal of wastes.—The drainage is practically part of the sewerage, as most of the surface and roof water is conducted, by open drains without traps, into the main stone sewer leading to the sea.

The rooms used as closets are fitted on each side with closet seats of stone, or imitation marble, over a continuous trough. At one end, inclosed within a closet, is an automatic dumping tank, one for each row of seats, and capable of dumping about 20 gallons of water every four or five minutes. This rush of water is partially checked at the outflow by a riffle evidently intended to retain a portion of water in the trough after each flushing. The outflow passes with a series of right-angled turns beneath the floor and outside the building, where all flow into a stone sewer, which also passes with several right-angled turns across the street and through the grounds of the First North Dakota to the sea, at about the level of high tide. Since the American occupation this sewer has been extended by iron piping across the sands to a point just above low-tide level. It is evident that the Spanish soldiers did not use toilet paper, and therefore when this sewer was first built the whole arrangement was a great improvement upon any other system then existing in the Spanish barracks. With the American occupation its defects became apparent. Our men not only used paper, but used whole sheets of newspapers, and the first and immediate effect was to clog the outflows beneath the floor. To remedy this, holes were cut through the cement floor into the sewer, and it was found necessary to leave these open that the accumulations might be removed from time to time. Continuous use of the sewer by a large barrack population had thoroughly soaked the porous stone of which it is composed, and the surrounding ground.

This regiment has continuously had a very high sick report, and the regimental and brigade surgeons attributed this in a great measure to these closets, which, they claimed, discharged large quantities of sewer gas within the Cuartel, and especially next door to the rooms used as kitchens. Constant reports of the condition were made and many suggestions offered for its correction. The division commander was much interested in the affair and gave it his personal attention and investigation. By his order, as a temporary expedient, a hole was broken into the main sewer, outside the walls of the building, to allow of the escape of gas at that point instead of inside. The objection to every plan proposed for its correction was the expense involved. The earth-closet system was not only expensive to install, but was a constant and daily expense to maintain. Closets to be built over the sea were proposed, but their distance from the Cuartel was a serious objection. As long as it is impossible to secure in the market here modern trapped water-closet bowls, it has been the claim of the division surgeon that the cheapest and best plan was to utilize the present troughs, but properly trap them at the outlet and lay a new iron sewer along a new line to the sea, disconnecting and sealing up the old sewer and even avoiding disturbing the soil about it.

Water supply.—As in all other barracks in this command, the water supply is from the city mains, and that used for drinking purposes is boiled and stored in earthen ollas.

Clothing.—As in all other commands, the clothing is now fairly well adapted to the climate and the supply at the depot is sufficient, so that individual deficiencies are not due to any inability to obtain the clothing.

Habits of the men.—As a rule, excellent. The percentage of venereal disease is in excess of what it should be, but it occurs very largely among those with other vicious habits, especially the intemperate.

Food supply and its preparation.—There is at present absolutely no fault to be found with the supply, and in this regiment its preparation is excellent. Great ingenuity has been exercised by the various companies in the erection of stone and brick ovens in the courtyard of the cuartel for use in bread making and roasting, the tops of many of which are used as huge stoves. The issue of fresh beef has been sufficient, and its quality is excellent. Companies which do not cook their own bread buy from those who do or from regimental bakeries, and the quality is equal to the best American city bakeries. Potatoes and onions, fresh, with the usual canned goods from the commissary and such green produce as can be obtained in the markets, supply an ample vegetable ration. The issue of rice in additional quantity by the commissary is appreciated, and, strange to say, those most liable to complain that the quantity is insufficient are newly arrived organizations. I find that many, especially among the officers who have been here for six months or more, crave and eat as much meat as they did in the United States.

FOURTH UNITED STATES CAVALRY.—The grounds formerly occupied by the Agricultural Exposition of Manila, mostly one-story pavilions of wood, practically on the ground. The central or executive building is two-storied and is used as officers' quarters upstairs. The buildings are practically all windows and doors and air space is not a problem. The ground is marshy and but a few inches above tide level. In fact, all that portion of ground in the rear of these buildings and now occupied by the new nipa barracks, erected for the new troops, was in August and September of 1898 covered with from 2 to 4 feet of water after heavy rains. A slightly elevated and paved road gives communication between the buildings.

Drainage, sewerage, and disposal of wastes.—No ground drainage at present. It remains to be seen what, if any, will be the effect of the ditches dug about the new barracks in removing surface water from the grounds. If it does not succeed in this, the present picket lines will be a bottomless swamp in the rainy season. Sewerage nil. Sinks were used until the earth-closet system could be established. Waste is collected in cans and removed by the sanitary department.

Water supply and clothing.—As described under the Fourteenth United States Infantry.

Food supply and its preparation.—This command, as old campaigners, has, in my opinion, the most satisfactory methods of food supply in operation in this division.

Habits of the men.—Excellent.

FIRST NORTH DAKOTA INFANTRY.—Quartered in nipa sheds or barracks, on the Calle Real and the seabeach, and situated directly across the street from the barracks of the Fourteenth Infantry. The soil is seabeach sand. The buildings had originally many windows, and since then many holes have been broken in the thatch walls, so that air space is not a problem.

Drainage, sewerage, and disposal of wastes.—Drainage is excellent both from the character of the soil and the slope of the grounds to the sea. The sinks are in the form of platforms built out on piers over the water. The tide sweep at this point is almost parallel with the shore line, and a portion of the waste matter is deposited upon the beach, but it remains there so short a time and is so thoroughly disintegrated by the action of the sea that no nuisance has ever been created. Waste is collected in cans and disposed of by the sanitary department or is buried in the sand. Much complaint arose in this command from the fact that the sewer from the barracks of the Fourteenth Infantry emptied on the beach at high-tide level, but after the new iron sewer was laid several hundred feet out to low-tide level no further complaint was justified.

Water supply, clothing, food supply and methods of preparation.—As described under the Fourteenth United States Infantry.

Habits of the men.—Fair. Venereal disease was too common for a long time.

Facilities for bathing.—Bathing in either sea or river has been constantly opposed by the medical officers on account of the filthiness of the waters, and the practice has been practically discontinued in this division. Every organization is supplied with shower baths served from the city water supply, and these are used very freely by the men. It does not require discipline to make men bathe in this climate.

Laundry facilities.—In some cases a few men in a company established a cooperative laundry, in which American methods were used and all clothing boiled. Such institutions were crowded with work. The native laundry women pound out the dirt with clubs in the filthy water of the river or in the sewage of esteros. The clothes are then spread upon the ground in the sun and kept wet by sprinkling until bleached. This accounts very largely for the prevalence of skin diseases, and especially of that most aggravating itch popularly called dohbie itch, situated in the groins and about the genitals, which has unfitted many men for duty, it being almost universally distributed, and most resistant to all methods of treatment. I am informed that in the Navy many men have been invalided home for this trouble alone.

The chief surgeon of the corps, February 28, 1899, forwarded the following brief account of the opening of hostilities by the insurgents on the evening of the 4th of that month:

For many days we were in expectation of an attack on our lines and this came at about 9 p. m. on the 4th and lasted till the morning of the 7th. Although the firing was active in front of several parts of our lines, nearly all wounds were received after midnight of the 4th and later in the month. A few of the mortally wounded arrived at the hospital before death took place. Those not mortally wounded gave every sign of hope of recovery on arrival. All were quickly brought in and dressing went on in order and with proper rapidity. They received instant attention on the field, for, although the attack was sudden and perhaps not looked for on that night, everything had been done in advance to secure the most thorough first aid in the event of an engagement.

The division surgeons and the medical officers of regiments were alert and everything necessary was in readiness for immediate use. The ambulance company was reassembled, ambulances thoroughly equipped, and the men served with travel rations. A full supply of first-aid packages, litters, lanterns, water, beef extract, dressings, stimulants, etc., was at hand, and the ambulances were reenforced by carriages and carromatas. I am able to say that our department was in fine condition at the moment of the first fire and continued to improve from day to day, so that there never was a delay in securing excellent attention for the wounded. The hospitals, too, were in readiness, the First Reserve Hospital (Crosby's) being used for all the severe cases and many of the slight ones; a few minor cases, however, were sent to the Second Reserve Corps Hospital (Keefer's), while a number of slight cases found their way to the regimental hospitals.

The men of the hospital corps were properly equipped and every man understood the part he was expected to take days before the attack, and there was the greatest enthusiasm among the men in performing the duty assigned to them.

The wounded are doing well at this date. They have every reasonable comfort and the prospect for their ultimate recovery is very encouraging.

Our supplies have been so liberally granted us that not a wish has been expressed that I have not been able to meet, and for all this we are grateful to the Surgeon-General.

It is a matter of congratulation that first-aid instruction had been given for some time, systematic teaching having been instituted in the regiments, so that the corps men were quite skillful in their first-aid work. The distance the men had to be taken before arrival at the First Reserve Hospital was from 2 to 6 miles, but this distance was covered quickly, though with every due consideration for the wounded.

The Government ambulances worked well, but we should have more of them. Only eight were available. However, with the other carriages we managed very well. Some of the wounded were taken in box cars from Caloocan, properly furnished with cots, blankets and pillows, etc., and on arrival at the depot in Manila they were carried in ambulances to the hospitals. Many of the slighter cases have returned to duty and others will soon do so. Thus far there have been no primary amputations excepting a few of fingers.

In a later report, March 31, 1899, the chief surgeon of the corps described the general conditions during the continuance of hostilities as follows:

Since the outset the greatest care has been taken to secure accuracy of record both in the First and Second Reserve Corps hospitals and in the regiments as well. Nearly all of the wounded were brought to the first-named hospital at once, but a number were taken to the Second Reserve, and many who are recovering are sent to the latter hospital from the First Reserve.

On the night of the 4th of February the first of a long series of engagements with the Filipinos began.

Total number of United States troops killed or who have died from wounds received since February 4 is 182.

Total number of wounded during same period and not included in above is 847.

Of the slight wounds, many of the patients have returned to duty, and quite a number have gone to quarters. Several lost little if any time, and were soon on the firing line again. The effect of the battle was marvelous on the sick, for it is a fact that many men who were hardly considered well enough for duty were soon in the line when the attack on our front became general. The severe cases are doing well, and it is believed that many of them will soon be in condition to be returned to the United States. A number of the wounded, together with the sick men and convalescents, were ordered home on the *Arizona*, which left here on the 10th instant. These patients will all do well on the way, and it is quite possible that many of the sick who could not recover here will be fit for duty by the time the transport arrives at San Francisco.

During and since the beginning of the outbreak our men have had every possible comfort, and the surgical attendance has been excellent.

The time has perhaps hardly arrived when a full history of the first aid afforded our men should be written. I may say, however, that the surgeons were not taken unawares. The medical officers of this command had been making preparation for a possible attack on our forces, and, when it did come, were ready for all emergencies. The first-aid packages have proven to be of the greatest possible value, indeed, our whole equipment reflects the highest honor for our department. Litters, pouches, medical and surgical chests were in readiness, easily prepared articles of food, stimulants and water were on hand, and our ambulance company (reassembled for this work) did, and is still doing, excellent service.

The Signal Corps put the hospitals in communication with the troops at the front, and thus we were able to send supplies at a moment's notice. For this we are all grateful, well knowing that much suffering was thereby prevented.

Our transportation is greatly improved by using the freight cars for wounded from Caloocan and Malolos, and by running the hospital boat up the river for those in the vicinity of San Pedro, Macati, and Pasig. Two horse litters were hastily constructed, bamboo poles being used. Coolies act as litter bearers under direction of members of the hospital corps. We have 16 ambulances, and a number of the kind of carriage known as quilez, also many carromatas.

Referring to supplies generally, it is simply astonishing that so far off from our country we have been able to find ourselves so well provided in everything essential. We have had an abundance of supplies of every description, the greater part of course brought from the United States, but many articles were purchased here. Besides medical stores obtained in Manila, we have been able to get a large number of rattan chairs and lounges. These were absolutely necessary for the comfort of the sick and wounded, and I knew would be approved by the Surgeon-General. These chairs and lounges are used chiefly out of doors, in shady places, and are much enjoyed by patients who are able to be about.

We have had ample funds to meet all demands. These were used chiefly for medical supplies that were running low prior to the receipt of stores from San Francisco. When obliged to purchase here we are able to procure good articles and at reasonable rates. We have three large storerooms—better are not to be found anywhere—and I believe I can say that none in the United States are better stocked. It has been the greatest pleasure to me that we have been able to meet the Surgeon-General's wishes in regard to sufficient medical supplies for this army. They have been and are now abundant and good. Among other articles purchased here was a large lot of pajamas: many have been issued and more soon will be, and are a great comfort to the patients.

The greater portion of this command has gone through a hardening process, so to speak. Many of the men are now able to withstand the heat fairly well and have learned to avoid well-known causes of disease. This is a matter that must be gained by experience, in great measure at least. The greatest pains have been taken to instruct men as to the care of their health, and circulars for this purpose have been supplied most generously. Still, diarrhea, dysentery, typhoid fever, and malarial affections arise among us. Of course, a large number of cases might have been avoided under certain circumstances, but this was hardly to be expected in an army hastily recruited. However, this corps has come through thus far with a very fair record in regard to health, and its spirit under the most trying conditions has been superb.

The food supply has been good from the time of our landing here. Of course, there may have been some defects, but these were few.

The issues to the troops for ten days are: Fresh beef, 7 days; bacon, 2 days; salmon, 1 day; potatoes, 75 per cent daily; onions, 15 per cent daily; tomatoes, 10 per cent daily. Two ounces each of rice, oatmeal, and dried fruits are issued, when desired, in lieu of 4 ounces of fresh beef on days when fresh beef is issued. It is difficult to see how a better list can be furnished, and, in my opinion, it is ample.

The clothing is certainly improving, and now men, as a rule, are provided with proper uniforms. The campaign hat, although warm, will never be abandoned, even in this hot climate. Nevertheless, a light, broad-brimmed, khaki-covered helmet should be furnished. Shoes, underwear, etc., now issued seemed to answer quite well, but time will determine this.

Members of the hospital corps are asking their discharge under the provisions of General Orders, No. 40, and Circular 45, Adjutant General's Office, 1898. It is evident that an effort must be made to replace the men who have entered the corps for the war; this I cabled to you to-day. The surgeons and hospital corps men have been most faithful in the discharge of their duties, whether in field or in hospital, and the results have thus far been excellent.

I made a few contracts with private physicians, being pressed for more professional help.

The female nurses are doing good work, which is much appreciated by all.

Two hundred and fifty-six wounded Filipinos (including four women) were received into hospital during February and March. Of these 45 (including a woman) died. These people receive the best of care and treatment and seem to appreciate the efforts made in their behalf. It is interesting to note the difference in results of treatment between our men and the Filipinos. In the latter suppuration of wounds is the rule, while we rarely see it in our cases. Many causes account for this, but the chief reason, of course, is infection before coming into our hands; besides, they have an inordinate propensity to tear off dressings and finger their wounds when opportunity offers.

The character of the service required of the Medical Department during the advance from Manila to Malolos and thence to San Fernando may be gathered from the following notes, for the months of April and May, forwarded by Maj. Henry F. Hoyt, chief surgeon, Second Division:

April 1.—Camp at Malolos, P. I. Dressing station and temporary local medical supply depot established in railway station house. Made inspection of troops, finding them in fairly good condition, recuperating slowly from the effects of the rapid advance and hot weather during the campaign to Malolos.

April 4.—Considerable diarrhea among troops. Inspection revealed impure water supply. Recommended condensed water be supplied per trains from Manila, which was so ordered by division commander.

April 6.—Made medical and sanitary inspection of entire division. Sanitary condition, excepting bathing facilities, good; troops improving physically.

April 9.—After experimenting for some weeks with native plant known as "sambong" as a prophylactic against insolation, it was thought best to instruct troops as to its appearance, location, and practical use, which was accordingly done by specimens of the plant being distributed by brigade, regimental, and assistant surgeons.

April 14.—Major Neff, surgeon, Tenth Pennsylvania Infantry, being ordered to Cavite with regiment, Maj. R. C. Warne, surgeon, First South Dakota Infantry, was placed in charge of dressing station and supply depot.

April 23.—Engagement of Second Brigade resulted in 43 wounded and 7 killed. All were promptly brought in by ambulances and transferred to hospital, Manila, per train.

April 24.—Engagement on the right resulted in 11 wounded and 6 killed. Some delay in bringing them to dressing stations, as ambulances were unable to find ford across Quingua River.

April 25.—Command advanced to Bag Bag, where temporary dressing station was established in church. Station and supply depot was forwarded from Malolos in the afternoon and located in station house by railroad track, where main dirt road from Malolos to Bag Bag crosses. After attending to forwarding casualties occurring in First Brigade and armored car discovered ambulance of Second Brigade with 4 dead and 26 wounded on north side Bag Bag River and unable to cross. A small canoe was found, the only one for some distance up or down the river, and one by one the wounded were safely crossed, placed in ambulances, carried to the dressing station, and without delay were en route per train to Manila. Considerable credit is due a Kanaka boy from Honolulu, with the First South Dakota Infantry, and a Filipino prisoner for skillful handling of the canoe, as our men were both inexperienced and exhausted.

April 26.—Major Rafter, Twentieth Kansas Infantry, was sent to Malolos to take charge of convalescents left there, some 150 in number.

April 27.—During the advance of Twentieth Kansas and First Montana north of Rio Grande, 1 was killed and 11 wounded; also 9 wounded Filipinos cared for. All were transported to Rio Grande by litter and hand car, thence across the river by canoe. A temporary dressing station had been placed in sugar warehouse south side Rio Grande. Wounded were then placed in ambulances, carried to Bag Bag River, where a damaged approach to bridge necessitated transferring across the bridge on litters. They were again put in ambulance, taken to dressing station, cared for during the night, and forwarded to Manila next morning on train. This entire incident occurred during a very heavy, chilling rain storm. It is with great pleasure that I invite attention to the special bravery of a medical officer of the division, Capt. H. D. Smith, assistant surgeon, Twentieth Kansas Infantry, a man who has often been called and never found wanting and who accompanied Col. F. D. Funston as he crossed the Rio Grande on a raft and was with the fighting line during the battle that followed this memorable event. Dr. J. S. Chaffee, assistant surgeon of the Monadnock, United States Navy, has been giving excellent service during the month with the Third United States Artillery and a squadron of the Fourth United States Cavalry, both attached to this division. It should also be reported that Lieut. R. P. Jenson, assistant surgeon, First Nebraska Infantry, has not reported for duty with his regiment since it left Manila.

Medical officers on duty, including chief surgeon	19
Hospital stewards	14
Acting hospital stewards	9
Privates (including 18 with ambulances)	57
Ambulances	6
Coolies (litter bearers) from about	100 to 125

The following table shows number of casualties in the different organizations for April, 1899, that have been reported to this office:

Organization.	Killed.	Wounded.
Fifty-first Iowa		15
Twentieth Kansas	3	12
Fourth Cavalry	3	6
First Montana	4	18
First South Dakota	8	23
Third Artillery	2	5
Sixth Artillery		2
First Nebraska	8	47
Utah Artillery	2	6
Total	30	134

May 1.—Dressing station and local medical supply depot still established in railway substation house at cross-roads, below Bag Bag, in charge of Maj. R. C. Warne, surgeon, First South Dakota Infantry.

May 5.—Moved dressing and supply station to vacant warehouse on south side Rio Grande River, just below bridge. Brought up hospital hand car and had it in readiness on railroad track, north side of Rio Grande. Four ambulances were taken across river on raft and placed on road in rear of Second Brigade. Two were left at Rio Grande dressing station to transport to and from end of track at Bag Bag. Advanced north about 5 a. m., First Brigade on and Second Brigade to right of railroad track. Second Brigade became engaged with enemy about 9 and First Brigade about 10 o'clock a. m. at Santo Tomas River. Crossed river about 1 p. m. Shortly afterwards engaged enemy again near railway station at Santo Tomas. Day was intolerably hot and men suffered greatly from heat and thirst, as canteens were emptied early in the day, and the water at Santo Tomas and vicinity was brackish. The wounded in Second Brigade, on south side Santo Tomas River, were sent to dressing station by ambulances. Those of First Brigade south of river were sent in by hand car. All injured on north side of river were carried on litters to the railway bridge 1 mile from station, ferried across on two cascoes lashed together, and sent to the dressing station 5 miles distant on hand car. Our men being all in an exhausted condition, Filipino prisoners were impressed to propel hand car. Wounded were cared for in dressing station, and all but last load on hand car were sent to hospital in Manila by train. The remainder, together with nine wounded Filipinos, were sent in next morning.

May 6.—Ambulances succeeded in crossing Pambaling and Santo Tomas rivers and reported at headquarters, which had been established at San Fernando. Major Warne was directed to turn over dressing and supply station to Major Rafter, surgeon, Twentieth Kansas Infantry, and report at headquarters. Three suitable houses were selected in San Fernando and a temporary hospital at once established.

May 7.—Major Warne reported and was placed in charge of hospital at San Fernando. All extra cots, blankets, and medical supplies were brought forward as rapidly as possible by the ambulances on their return trips from transporting sick and injured to the north end of the Rio Grande bridge.

May 11.—After personal inspection and receipt of reports from medical officers made report to division commander on general physical condition of troops; report unfavorable; men very much exhausted and debilitated.

May 22.—Diarrheal troubles being on the increase in command, recommendations were made by this office that the sale and consumption of fruit be regulated and restricted, it being possible that the indiscriminate use of same by troops assisted in increasing the sick rate.

May 24.—Engagement occurred west of town, in which First Montana, Twentieth Kansas, and part of Utah Light Artillery took part. Wounded were brought in by ambulances, cared for at hospital, and sent to Manila on train at 3 p. m.; 35 wounded Filipinos were sent in also.

May 25.—By verbal authority from division commander five buildings were selected on corner of Calles Maura and Dolores and a division field hospital established therein, the first in the Filipino war. It was arranged, for the present, with a maximum capacity of 200 beds. Major Guy L. Edie, brigade surgeon, United States Volunteers, having reported for duty, was assigned by division commander as officer in charge. The wounded occurring in engagement on front of Second Brigade, 3 p. m., were brought in by ambulances, cared for in division field hospital, and sent to Manila by train next day.

May 29.—Made following report and recommendations to division commander: * * * "I have the honor to respectfully invite your attention to the following facts and recommendations regarding sanitary matters at this camp: At present the excreta of the men are, with few exceptions, deposited in the ordinary sink, dug from two to six feet in depth and deodorized by frequent applications of earth. The exceptions are closets built over the edge of river bank, the excreta dropping into the river. If this is to be a permanent camp the sink system will soon become an objection and a nuisance, as the shallowness of the soil will necessitate frequent removals, which will in time honeycomb the adjacent vicinity with sinks. Would recommend that where quarters are within 300 feet of river bamboo closets of proper dimensions be built over the river bank, extending out sufficiently to allow excrement to be dropped into the current. Where this is not practicable, and where house closets are used that are not drained into the river, would recommend the earth closet. A scavenger department equipped with native laborers should be organized, whose duties should be to clean streets and remove and dispose of all refuse. Men should police their own quarters, depositing the refuse in convenient place to be removed by scavengers. Cooks should do the same with kitchens and garbage. The contents of earth closets should be removed at regular intervals by scavengers and dumped into the river at some point below any habitation. The street sweepings, animal manure, and camp refuse generally should be carted out and dumped into some ravine at least a mile from camp, where, if possible, it should be burned from time to time." * * * Was granted permission and exchanged Chinese coolies employed at hospital for Macabebes. The coolie is very satisfactory as a litter bearer, but is not efficient as an all-around worker in a hospital.

May 31.—At this date the troops that have been with this division on this expedition since February 4, 1899, are in an exhausted and debilitated condition. This statement refers particularly to the First Nebraska, First South Dakota, First Montana, and Twentieth Kansas, all United States volunteer infantry. They were practically exhausted when this camp was reached May 6, and under the influence of guard and outpost duty, several short marches, engagements in the daytime, and an occasional alarm at night that they have participated in since that date, it is observed that their recuperation is slow.

The following is a numerical report of casualties occurring in the division during the month:

Organization.	Killed.	Wounded.
Fifty-first Iowa	----------	8
Twentieth Kansas	3	21
First Montana	1	8
First South Dakota	1	7
Fourth United States Cavalry	----------	3
Seventeenth United States Infantry	----------	1
Twenty-second United States Infantry	1	4
Total	6	52

The numerical report of the personnel of the medical department of this division on duty during the month was as follows:

Medical officers, including the chief surgeon	27
Hospital stewards	19
Acting hospital stewards	17
Privates (including 18 with ambulances)	110
Ambulances	9
Coolie litter bearers	78

After the occupation of San Fernando the regiments of the Second Division were reported by brigade surgeons at their semimonthly inspections as thoroughly exhausted by the hardships and exposures of the campaign, which had lasted continuously since the insurgent outbreak, on February 4. During this period they had been subject to many depressing influences. The great strain on the muscular and nervous energies attendant on the constant fighting, with the coincident want of needed rest, necessarily resulted in a corresponding degree of lowered vitality. The men had been exposed alternately to violent rainstorms and oppressive heat, with no means of protection from either, nor facilities for lessening the discomforts or dangers of the situation. The neglect of the person, so common among soldiers under the conditions of an active and long-continued campaign, gave rise to irritating skin eruptions, which in themselves were a cause of loss of rest and increased depression of the vital powers. Besides all this, it appears that they suffered also from an insufficient dietary, for, on account of the difficulties of transportation from Columpit to San Fernando, they had subsisted for three weeks on the travel ration, some of the items of which had nevertheless failed to reach them. Their ration during this period had consisted merely of hard bread, corned beef, and coffee. Moreover, as all available transportation was engaged in bringing up subsistence, many of the men were badly in want of shoes and clothing. Diarrhea and dysentery became very prevalent, and so enervated the command that, according to Maj. F. J. Adams, chief surgeon of the First Brigade, few of the men were able to make a march of ten miles. It is to be noted that no taint of scurvy was suggested to account for this. On the contrary, a great part of the disability of the troops was attributed by some observers to the excessive or indiscriminate use of fruit, which was abundant in the country passed over and then occupied. The Division Commander, Maj. Gen. Arthur McArthur, United States Volunteers, in an indorsement on Major Adam's report, gave an accurate summary of the causes productive of this broken-down condition of his division. He expressed himself in the following terms:

> The duty required from the men of this brigade, in common with the other commands of the division, has been severe and continuous since February 4 of the current year. The sun, field rations, physical exertion, and the abnormal excitement arising from almost constant exposure to fire action have operated to bring about a general enervation, from which the men do not seem to recover readily, although the present conditions are very favorable. The four regiments now present have an enlisted strength of 3,701; of these, 1,003 are sick or wounded, leaving an effective force of 2,698, which, after deducting necessary details for special duty, yield only 2,307 for the firing line, many of whom could not march five miles under the conditions which obtained from Malolos to this place [San Fernando].

Ultimately, when the railroad was repaired, the food supply became ample and varied, and all needful clothing was issued, but the men were slow in recuperating. At this time they were well quartered in nipa huts. The water supply was ample and of good quality. The sinks, when not overhanging the river, were well policed. The kitchens were in excellent condition and the food well prepared. Besides, San Fernando had a local reputation as a healthful locality; in fact, it was regarded by the Filipinos as a kind of health resort. Yet the sick lists of the commands continued to increase and the sick failed to show any noteworthy sign of progress toward recovery of their strength. These regiments were shortly afterwards withdrawn from San Fernando to their barracks in Manila, where a change for the better was speedily manifested in the medical records.

Meanwhile, in anticipation of the return of the volunteer troops from the Philippines for muster out, the construction at San Francisco, Cal., of a model camp for their reception was in progress. This camp, situated on the reservation of the Presidio, is intended to shelter five regiments. It consists of a series of wooden buildings, placed parallel to each other and 40 feet apart. Each building contains two kitchens and dining rooms, and, in connection with neatly floored conical wall tents, is intended to furnish accommodations for two companies. The buildings and tents have been provided with stoves. The administration building, storehouses, muster-out offices, and officers' tents are in front of the lines of company quarters, while in rear are the lavatories, bath houses, and sinks. A lavatory for each company is immediately in rear of each kitchen. Beyond this is a bath house, with shower appliances, for each battalion. The sinks are built and equipped on the trough system (see page 210), and are emptied twice daily by odorless excavators. Civilian scavengers attend to the troughs and remove all garbage and other camp refuse.

Three large camps, one for 2,000 men and the others for 1,000 men each, were also constructed on the reservation to accommodate recruits arriving en route for the Philippines. The plan of these camps is modeled on that of the muster-out camp.

Meanwhile the division hospital on the grounds was expanded into the San Francisco general hospital. Pavilion wards, storehouses, and quarters were built, and the establishment was provided with everything necessary for the treatment of 1,000 men disabled by sickness or wounds.

Provision was made on Angel Island, in the bay of San Francisco, for any troops that may have to be placed in quarantine on their arrival. A detention camp, arranged after the plans of the model camp for volunteers, was constructed in two sections, each to accommodate one regiment, and separated from each other by a street 45 feet wide, on which are two parallel fences of barbed wire, 6 feet apart, intended for the separation of commands having different dates of arrival. Each section has a well-equipped tent ward of 18 beds for general use, and an isolation ward of 6 beds for suspected cases. The sanitary care of this camp is under the supervision of the surgeon of the Marine-Hospital Service in charge of the quarantine.

The following extract from a report by the Medical Inspector of the Army, Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, shows the conditions existing in these camps July 31, 1899:

Camp of Volunteers (*Model Camp*).—This is now occupied by three regiments, the Second Oregon, the First Nebraska, and Tenth Pennsylvania, and the Utah Battery, aggregating about 3,500 men, the infantry regiments being in the section on the north side of the railway track and the artillery on the south side. The general health of the men is excellent, the sick report, exclusive of the cases that were placed in the hospital immediately after arrival, being 4.6 per cent of the effective force, and made up of such trivial ailments as mild affections of the air passages, indigestion, rheumatism, etc.; the fears that were entertained of serious illness owing to the climate and the scantily clad condition of the men have not been realized; many of the men had thick clothing on arrival, and those who had none borrowed from their more fortunate comrades; nearly all have observed the precautionary directions against exposure, and the comfortably heated quarters have given them shelter and lounging places when off duty; civilian employees have kept the latrine troughs, garbage and waste cans in excellent order, and the urine tubs placed each night in the company streets have freed the camp ground from defilement of this nature. The trough system for latrines is a perfect success, and these places, instead of being noisome sights, are now the show places of the camp, the houses and their surroundings being neat and clean in appearance and entirely free from bad odor; indeed, there is nothing about them that can offend the senses of sight or smell The interior police of the camp of the Second Oregon Volunteers is not good; kitchens, dining rooms, bath houses, and lavatories are not kept tidy or clean, in spite of orders reiterated each day by the colonel of the regiment; the contrast between the work of the scavengers at the latrines and about the garbage cans with that of the soldier police in the quarters, kitchens, and dining rooms is very marked and fully sustains the opinion previously expressed in my reports that the untrained soldier can not be made to do the work of a scavenger, to which I must add, nor can he be made to keep himself or his surroundings clean. The food supply is abundant, well prepared, cooked, and served. There is added to each 100 of the regular rations 12½ gallons of milk, 10 pounds of butter, and 10 dozen eggs; this is furnished by the Subsistence Department under the act of Congress approved March 3, 1899, for "issues to enlisted men in camp during the periods of recovery from low conditions of health, consequent upon service in unhealthy regions or in debilitating climates." It may truthfully be said that the food in this camp is much better in variety, quality, and preparation than is found in the average hotel anywhere in this country. The medical records of the Second Oregon Regiment are in excellent condition, better, in fact, than any other Volunteer regiment I have seen at muster out; I have not yet examined the records of the other regiments here. The medical and hospital property of this regiment has been transferred to the Supply Depot in San Francisco and the regimental hospital has been furnished from the general camp supply I had approved for the troops.

The Detention Camp, Angel Island.—This camp is so far completed that one regiment can be accommodated at any time. The hospitals for contagious and noncontagious diseases are in position and equipped, a medical officer and detail of hospital corps men are on the ground, and a common dispensary is ready for service. Fortunately up to this date there has been no occasion to place any of the incoming transports in quarantine, and therefore the camp has not been used.

Camps of recruits.—These camps have an occupancy of about 4,000 men, although this number changes from day to day as transports leave for the Philippines and recruits come in from the East. The general health of the men is excellent, the sick report showing an average percentage of 5.8, of which 33 per cent is vaccinia, 10 per cent malarial in men who have had previous service in Cuba, and the remainder rheumatism, indigestion, venereal, etc. Boards of medical officers are in session for the reexamination of the men who arrive, and many have been rejected: the exact percentage I have not been able to ascertain, but it is large enough to show that sufficient care is not yet exercised in the selection of recruits, especially for service in the Tropics.

Four cases of typhoid fever have been taken to the general hospital from these camps, the history of each one of which I studied carefully as soon as it was reported, and all gave evidence of importation. Precautionary disinfection in the camp latrines has, however, been thoroughly practiced, and I think there is no danger of this disease gaining any foothold. In order that errors in diagnosis may be avoided, medical officers are instructed to make careful study of all fever cases. Advantage was taken of the occurrence of these cases to introduce the trough system of latrines and to do away with the dry earth box system previously in use: the change will be completed in a short time; the urine tubs are in use in these camps also.

Complaint having been made of the presence of vermin in the bedding and clothing of some of the men, I had large caldrons for boiling water put up in the camps, into which material so infested was ordered to be placed: these caldrons when not so used supply hot water for the laundrying of the clothing of the men, galvanized iron washtubs having been furnished for this purpose.

The food of the recruits is ample in quantity, but has little variety beyond the regular ration: it is fairly well cooked, but indifferently served; mess tables had to be made from any lumber that was available in the two older camps, but in the new camps they were furnished with the buildings. The latrines, garbage cans, etc., are emptied by men of the sanitary corps, and the kitchens, tents, etc., are policed by soldiers. There is a great difference in the cleanliness of this and the volunteer camps: here the police work of the recruits, under the direction of regular officers, is well and thoroughly done; the kitchens and cooking utensils, the tents and the company streets being kept in excellent order.

I submit in this place a general review of the history of this corps and of the sanitary influences affecting it written by the chief surgeon, Lieut. Col. Henry Lippincott, deputy surgeon-general, United States Army, January 31, 1899.

REPORT OF LIEUT. COL. HENRY LIPPINCOTT, U. S. A., CHIEF SURGEON, DEPARTMENT OF THE PACIFIC AND EIGHTH ARMY CORPS, DATED MANILA, P. I., JANUARY 31, 1899.

MEDICAL AND SANITARY HISTORY OF THE EIGHTH ARMY CORPS.

In accordance with orders from Headquarters of the Army, I arrived in San Francisco on the 25th day of May, 1898, and by direction of the Commanding General immediately assumed charge of the medical department of the expeditionary forces. Many of the troops that had been assigned to the expedition had arrived in San Francisco and were encamped in the suburbs, the location being officially known as "Camp Merritt." The encampment was some 5 miles from the headquarters which were in the Phelan Building in the city, and though connected by the excellent street railway system of San Francisco, communication with the officers there was somewhat inconvenient.

On the day of my arrival the first fleet of transports, carrying the First California and Second Oregon Volunteers and five companies of the Fourteenth United States Infantry, all under the command of Brig. Gen. T. M. Anderson, left San Francisco for the Philippines, and several other vessels had been obtained and were being prepared for the transportation of troops. Necessarily my first act was to establish an office, and second to secure proper hospital accommodation at Camp Merritt. Of the latter I shall speak later.

This command, presumably at first intended as but a small force, was known as the Expeditionary Forces to the Philippines. Later the Department of the Pacific was formed and General Merritt was assigned to the command, and toward the end of June the troops serving in the department were designated as the Eighth Army Corps.

By General Orders, No. 2, of the department all the troops then at Camp Merritt or to arrive were organized into an "Independent Division," with Maj. Gen. E. S. Otis, United States Volunteers, in command. The headquarters of this division were at the camp. Four brigades were formed at the same time, but as they were merely of a provisional character, subject from the nature of the conditions to constant change on account of the arrival and departure of troops, and lacking entirely the element of permanency, it seems unnecessary to give them in detail here. The following list, however, represents all the organizations, with their numerical strength at that time, which had up to June 29, reported for duty in the department:

	Officers.	Enlisted men.
Fourteenth United States Infantry (10 companies)	19	544
Eighteenth United States Infantry	20	576
Twenty third United States Infantry	20	578
Third United States Artillery (4 batteries)	10	500
Fourth United States Cavalry (6 troops)	18	600
First Company, United States Engineers (forming)	2	60
Thirteenth Regiment Minnesota Infantry	49	906
Twentieth Regiment Kansas Infantry	50	980
First Regiment Idaho Infantry (8 companies)	40	637
First Regiment North Dakota Infantry (2 battalions)	40	630
Tenth Regiment Pennsylvania Infantry (2 battalions)	39	620
First Regiment Colorado Infantry	49	970
First Regiment Nebraska Infantry	50	971
Seventh Regiment California Infantry	50	973
First Regiment California Infantry	49	970
First Regiment Montana Infantry	48	962
First Regiment South Dakota Infantry	43	900
First Regiment Wyoming Infantry (1 battalion)	14	324
1 troop Utah Cavalry	3	180
2 batteries Utah Light Artillery	7	265
Second Regiment Oregon Infantry	49	970
Total	629	14,110

Upon arrival of the headquarters off Cavite, P. I., the troops then there were organized into one division, called the Second, with two brigades. This organization is accurately given in the report of the chief surgeon of the division, Major Cardwell, and it seems unnecessary to repeat it here. I shall, therefore, content myself with giving the details of the organization of the corps as it obtains at this time, though the conditions here render frequent and important changes necessary.

	Officers.	Enlisted men.
FIRST DIVISION.		
Maj. Gen. THOMAS M. ANDERSON, U. S. V., commanding. Maj. HERBERT W. CARDWELL, chief surgeon, U. S. V., chief surgeon.		
Attached to the Division.		
Light Battery D, 6th U. S. Artillery	2	100
Separate Mountain Battery	1	50
First Brigade.		
Brig. Gen. CHAS. KING, U. S. V., commanding. Maj. GEORGE FRANKLIN SHIELS, brigade surgeon, U. S. V., surgeon.		
4th U. S. Cavalry (six troops)	9	526
14th U. S. Infantry (ten companies)	22	1,041
1st Regiment California Infantry	49	1,210
Total	80	2,777
Second Brigade.		
Brig. Gen. SAMUEL OVENSHINE, U. S. V., commanding. Maj. GEORGE H. PENROSE, brigade surgeon, U. S. V., surgeon.		
1st Regiment Washington Infantry	44	1.112
1st Regiment Idaho Infantry (two battalions)	31	605
1st Regiment North Dakota Infantry (two battalions)	29	634
Total	104	2,351
Total First Division	187	5,278

	Officers.	Enlisted men.
SECOND DIVISION.		
Maj. Gen. Arthur MacArthur, U. S. V., commanding. Maj. Henry F. Hoyt, chief surgeon, U. S. V., chief surgeon.		
Attached to the division.		
Utah Light Artillery (two batteries)	8	325
First Brigade.		
Brig. Gen. H. G. Otis, U. S. V., commanding. Maj. F. J. Adams, surgeon, 1st Montana Volunteer Infantry, acting surgeon.		
3d U. S. Artillery, (four batteries)	16	692
1st Regiment Montana Infantry	45	932
20th Regiment Kansas Infantry	44	1,056
10th Regiment Pennsylvania Infantry (two battalions)	30	570
Total	• 135	3,250
Second Brigade.		
Brig. Gen. Irving Hale, U. S. V., commanding. Maj. Samuel O. L. Potter, brigade surgeon, U. S. V., surgeon.		
1st Regiment Colorado Infantry	41	1,158
1st Regiment South Dakota Infantry	46	952
1st Regiment Nebraska Infantry	43	995
Total	130	3,105
Total Second Division	293	6,680
FIRST SEPARATE BRIGADE, ILOILO.		
Brig. Gen. Marcus P. Miller, U. S. V., commanding. Maj. E. R. Morris, brigade surgeon, U. S. V., surgeon.		
Battery G, 6th U. S. Artillery	7	136
18th U. S. Infantry	31	1,097
51st Iowa Infantry	46	941
Total	84	2,174
PROVOST GUARD, MANILA.		
Brig. Gen. Robert P. Hughes, U. S. V., commanding.		
BOARD OF HEALTH.		
Maj. Frank S. Bourns, chief surgeon, U. S. V., president. Acting Asst. Surg. Charles McQuesten, U. S. A., member. Acting Asst. Surg. B. Ffoulkes, U. S. A., member.		
TROOPS.		
23d U. S. Infantry	28	1,106
2d Regiment Oregon Infantry	48	1,226
13th Regiment Minnesota Infantry	49	1,225
1st Regiment Tennessee Infantry (two battalions)	33	817
Total	158	4,374
DISTRICT OF CAVITE.		
Col. William C. Smith, 1st Tennessee Volunteer Infantry, commanding. Capt. P. L. Jones, assistant surgeon, 1st Tennessee Volunteer Infantry, surgeon.		
1st Regiment Tennessee Infantry (one battalion)	16	480
1st Regiment Wyoming Infantry (one battalion)	14	302
Batteries A and B, California Heavy Artillery	11	355
Light Battery A, Wyoming Artillery	3	83
Troop A, Nevada Cavalry	3	85
Total	47	1,305
ATTACHED TO THE CORPS.		
1st and 18th Companies, Signal Corps, U. S. V	9	88
Company A, U. S. Engineers	2	113
Total	760	20,012

Staff officers and hospital corps not counted.

The camps occupied by this force were as follows: Camp Merritt, at San Francisco, Cal.; Camp Dewey, at the village of Tambo, near Manila.

The nature of the latter and the conditions prevailing therein are thoroughly described in the reports of Majors Cardwell and Potter, and since I am unable to add anything of value to them it is needless to dwell on the matter here.

Camp Merritt was situated on the western heights of the city of San Francisco, Cal. It was not an ideal camping ground for troops, especially for raw troops, but perhaps the best obtainable on the city side of the river. Being situated on high ground, it was necessarily very much exposed to the winds and the mists that prevail in the early months of the year in that locality. A considerable number of pneumonia cases was the result. The site was sandy and porous and heavy under foot. From the nature of the situation the drainage should have been excellent, but the subsoil water was but a few feet beneath the surface. The water supply for drinking and cooking purposes was derived from the city mains, and it is thought to have been of good quality. The Quartermaster's Department furnished cans for the collecting of garbage, and made a contract with a civilian for its daily removal. Vaults, covered with sheds, were dug for privies, but in many cases they had been put too near the kitchens and sleeping quarters of the men, no doubt due in many instances to the limited area of the camp. They were also not properly cared for. In many cases not sufficient earth was thrown in, rendering the place foul and offensive in a few days. In other cases the vault would be filled in a short time, necessitating the digging of a new one. All this is doubtless to be attributed to the lack of experience and supervision of the responsible officers.

Under my direction Maj. E. R. Morris, brigade surgeon, made a thorough inspection of this camp on June 16, and reported as follows concerning the general conditions prevailing therein:

"I have the honor to report that in accordance with your directions I have this day made an inspection of Camp Merritt, with especial reference to the sanitary conditions of the kitchens and sinks. I found a number of the latter in an offensive condition, and some of them filled to almost overflowing. Many of the sinks showed no recent trace of earth having been thrown in, although I was told by provost sergeants that this was done two or three times a day. I think if officers of the day were required to carefully and frequently inspect these places their condition would be improved. My inspection was made yesterday in the afternoon. I find that one sink as a rule is provided for the use of a battalion—about 300 men—and that the pit becomes filled in from ten days to three weeks. It is inferred from the shortness of the period that unnecessarily large quantities of earth are thrown in, and from the bad state of some of the sinks, that sufficient care is not exercised in placing the earth—too much is thrown in at one time or in one place. Probably ashes or quicklime, if such could be supplied, would answer better than the sand now being used. In Circular No. 1, Surgeon-General's Office, April 25, 1898, I find the following in regard to sinks: 'The surface of fecal matter should be covered with fresh earth or quicklime or ashes three times a day. New sinks should be dug and old ones filled when contents of old ones are 2 feet from the surface of the ground.'

"Either this may be done or the contents of the old ones be removed by the scavenger. I understand that the latter plan can be carried out at a moderate cost, and without offense to the neighborhood. The scavenger removes the excreta at night and thoroughly disinfects the vault before leaving it. Taking into consideration the environment of Camp Merritt and the probable period of its occupation, it is believed to be better to have the excreta removed in the manner indicated than to leave it in the soil and go on doubling the original number of sinks every ten days, and if the plan be found practicable, its adoption is respectfully recommended. Another criticism in regard to the sinks is the closeness of most of them to the company kitchens, the distance between the two in many instances not exceeding 10 yards.

"The arrangements for the removal of garbage are susceptible of improvement. Each kitchen is provided with an iron receptacle, but its size is inadequate, and moreover, most of the cans leak, so that the liquid refuse instead of being carted away is distributed into and over the soil in the immediate vicinity of the kitchens. In many cases the cooks have portions of the garbage buried in shallow pits, dug just outside of the kitchen tents. Burial of garbage is a suitable way of disposing of it, but it should be buried at a proper depth and in a suitable place. I was told by some cooks that the garbage collector called twice a day, and by others that he called not oftener than once in three days, and one organization at least—the North Dakota regimental hospital—is unprovided with a receptacle and has not been visited by the collector at all.

"It is respectfully recommended that the number of garbage receptacles be increased to meet the needs of the troops, and that those that are leaky be replaced by good ones, and finally that the collector be required to do his work in an efficient manner."

Notwithstanding the crowded condition of the camp, the inexperience or carelessness of responsible officers and the unfavorable circumstances of season and location generally, there was at no time a very serious outbreak of infectious or contagious disease. Measles prevailed to a considerable extent, but was brought from State camps. The same may be said of typhoid fever.

As my knowledge of the sanitary matters of the camp is limited to the time of my departure from San Francisco, I am unable to speak as fully as I might with regard to the prevailing diseases.

Medical organization and service.—No attempt was made at San Francisco to assign division and brigade surgeons to their proper functions. The organization of the troops at that point partook so much of a provisional character, that it would have been quite inadvisable to attempt any assignment of these officers. Moreover, many of them were not present. Major Cardwell had left San Francisco as one of the surgeons of the Second Oregon Volunteers. Major Bourns left for the Philippines June 16, the day after his arrival in the city. This officer has been continuously on special duty. Soon after the fall of Manila he was placed in charge of the sanitary department of the city, and in his capacity as president of the board of health he rendered most important and efficient service to the army. I can not speak too highly of his energy and knowledge of local affairs, and the enormous amount of valuable work he has been able to accomplish. Major Hoyt reached Manila on December 13 and was assigned to the Second Division, a post previously held by Major Crosby as acting chief surgeon.

Similarly with Brigade Surgeons Owen, Crosby, Morris, and Woodruff, who received their commissions while still at San Francisco. The first and third had very important duties to perform at Camp Merritt in establishing and organizing a field hospital, and in equipping the hospital corps. Crosby accompanied the second fleet of transports to Manila, while Woodruff was the attending surgeon for the headquarters. Penrose did not get his appointment till after arrival in Cavite. Potter did not receive his commission until after the departure of the headquarters.

The only assignments made at San Francisco were the sending of some volunteer assistant surgeons to the field hospital. They were always relieved from hospital duty in time to accompany their regiments to the Philippines.

Upon arrival at Cavite, however, it became necessary to assign a few volunteer assistant surgeons to the hospitals. Only one surgeon was taken from his regiment; this was Major Fitzgerald, of the Thirteenth Minnesota Volunteers. He is an experienced operator, and it was necessary that I should have such for the First Brigade hospital. He has been continuously on duty at the largest hospitals since his arrival in the Philippines, and has done a great deal of important surgical work. Major Crosby, ably assisted by Captain Straub, has also done a large amount of excellent surgical work in addition to his many other duties. Both Crosby and Fitzgerald have performed a great many operations for the radical cure of hernia, with wonderful success. The operation for appendicitis has been done in the First Reserve hospital quite frequently and very successfully. Surgeon Kemble, of the First Colorado, performed the operation of gastrotomy in Camp Dewey—the case is noted in the monthly report of sick and wounded of the hospital (then known as Second Division) for August—recovery.

It may be remarked here that I have not experienced any serious difficulty in securing volunteer medical officers for service at the hospitals, or in fact for any other detached duty. All seemed only too anxious to partake of the experience that could be gained only at these institutions. Only one colonel objected to the absence of his medical officers.

To some extent, however, I sympathize with these objections. In barracks, or camp, with large hospitals at convenient distance, three surgeons are not always necessary for a regiment. But in active campaigning the matter assumes a different aspect. Three surgeons then become an absolute necessity for a regiment of three battalions. Especially does this hold good in campaigning in the Philippines. Here the conditions are such that the wounded must receive careful attention at or near the firing line, for they can not be rapidly reached by ambulances or other means of transportation. The broken nature of the ground, and the almost total lack of passable roads often necessitate the carrying of the wounded to a great distance by hand litters. Fully appreciating these conditions from the first, I determined upon a policy of not taking a greater number of surgeons from the regiments than was absolutely necessary for the proper service of the hospitals. During the assault on Manila each regiment of three battalions, with one exception, had two medical officers on duty with it; and this policy has been consistently carried out so far as I was able, until at the present time, should the anticipated trouble with the Filipinos take place, nearly every volunteer regiment will have its three surgeons to take the field with it.

Hospital corps.—The obtaining of a sufficient number of members of the hospital corps for the expedition was a subject of serious concern. Upon my arrival at San Francisco I found some seventy-five privates enlisted for the corps. These were about the hospital at the Presidio, and unequipped. They were soon ordered to the field hospital and directions given to the surgeon in charge to provide them with uniforms and equipment. The first fleet had left San Francisco with but one steward and five privates, who accompanied the five companies of the Fourteenth United States Infantry, while the two volunteer regiments had no hospital corps at all, except the three stewards allowed by law. I learned, however, that twenty-four men had been detailed from each regiment for hospital work, and as it was found that this had been done in a number of other regiments still at Camp Merritt, I determined at once to have these men transferred to the regular corps, since the authority therefor, General Orders, No. 58, had just arrived. By properly placing the matter before regimental surgeons, I succeeded in transferring about 150 privates previous to my departure from San Francisco, and up to this date we have transferred 250, including those from regular regiments. Enlistments at the same time were continued, but although every effort was made to induce men to join the corps, and the requirements as to intelligence somewhat reduced, this corps never succeeded in getting more than one-half its quota of hospital corps privates. Necessarily this deficiency hampered the service to a great extent, and imposed an enormous amount of labor on the few men we did get.

At the time of our arrival in the Philippines we had but 144 privates; 48 were transferred from the Second Oregon and First California Volunteers, making in all 192 at our disposal at the time of the attack on Manila.

These were distributed as shown in the following table:

	Volunteer hospital stewards.	Regular hospital stewards.	Acting hospital stewards.	Privates.	Total.
With regiments	14		4	60	74
Ambulance company	3	1		50	58
First Brigade Hospital	2	1		27	30
Second Brigade Hospital		1	1	27	29
Cavite Hospital	2	1	2	25	30
Corps headquarters		1		2	3
Division headquarters				1	1
Brigade headquarters					
Total	21	5	7	192	225

In our peculiar circumstances it was not deemed wise to leave but one private with a regiment. During the attack on Manila each regiment had from two to four and it was found that this number was not sufficient. I have therefore constantly striven to increase the number with the regiments consistent with proper service at the hospitals. The accompanying table shows the distribution of the corps on January 31, 1899. Regiments so situated that they are able to conduct a hospital are those that have the greatest number of privates.

	Volunteers.				Regulars.						Hospital corps.				
	Contract surgeons, special.	Brigade surgeons.	Surgeons, regimental.	Assistant surgeons.	Lieutenant-colonel.	Major.	Captains.	Lieutenants.	Acting assistant surgeons.	Total.	Volunteer hospital stewards.	Regular hospital stewards.	Acting hospital stewards.	Privates.	Total.
One corps headquarters	....	....	....	....	1	....	1	....	....	2	....	2	....	4	6
Two division headquarters	2	....	....	....	....	....	....	....	....	2	....	....	....	1	1
Five brigade headquarters	....	4	1	....	....	....	....	....	....	5	....	1	....	7	8
1st Reserve Hospital	....	2	1	5	....	....	1	....	2	11	3	3	5	161	172
2d Reserve Hospital	....	....	....	1	....	....	1	....	2	4	....	1	3	35	39
District Hospital, Cavite	....	....	....	....	....	....	....	1	2	3	3	....	1	25	29
Hospital, Corregidor	....	1	....	....	....	....	....	1	1	3	....	2	3	50	55
Manila health department	1	....	....	....	....	....	....	....	2	3	1	....	....	....	1
Supply depot	....	....	....	....	....	1	....	....	....	1	....	1	1	4	6
4th Cavalry	....	....	....	....	....	....	....	....	1	1	....	....	1	2	3
Troop A, Nevada Cavalry	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Battery A, Wyoming Artillery	....	....	....	1	....	....	....	....	....	1	1	....	1	3	5
Two batteries California Heavy Artillery.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Four batteries 3d Artillery	....	....	....	....	....	....	....	....	1	1	....	....	1	2	3
Two batteries Utah Artillery	....	....	....	....	....	....	....	....	1	1	....	....	1	2	3
Battery D, 6th Artillery	....	....	....	....	....	....	....	....	1	1	....	....	1	1	2
Battery G, 6th Artillery	....	....	....	....	....	....	....	....	1	1	....	....	1	3	4
Company A, Engineers	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
23d Infantry	....	....	....	....	....	....	....	....	2	2	....	....	2	5	7
18th Infantry	....	....	....	1	....	....	....	....	1	2	....	1	2	8	11
14th Infantry	....	....	....	....	....	....	....	1	1	2	....	....	3	3	6
1st California Infantry	....	....	1	....	....	....	....	....	2	3	3	....	....	9	12
1st Colorado Infantry	....	....	1	1	....	....	....	....	....	2	2	....	1	4	7
1st Idaho Infantry	....	....	1	....	....	....	....	....	1	2	1	....	1	3	5
51st Iowa Infantry	....	....	1	1	....	....	....	....	....	2	2	....	....	9	11
20th Kansas Infantry	....	....	1	1	....	....	....	....	....	2	3	....	....	7	10
13th Minnesota Infantry	....	....	....	2	....	....	....	....	....	2	2	....	....	2	4
1st Montana Infantry	....	....	1	1	....	....	....	....	....	2	3	....	....	7	10
1st Nebraska Infantry (12 companies).	....	....	1	1	....	....	....	....	....	2	3	....	....	4	7
st North Dakota Infantry (8 companies).	....	....	1	....	....	....	....	....	....	1	1	....	1	5	7
2d Oregon Infantry (12 companies).	....	....	1	....	....	....	....	....	1	2	1	....	....	4	5
0th Pennsylvania Infantry (8 companies).	....	....	1	1	....	....	....	....	....	2	2	....	1	3	6
st South Dakota Infantry (12 companies).	....	....	1	2	....	....	....	....	....	3	2	....	1	7	10
st Tennessee Infantry (12 companies).	....	....	1	2	....	....	....	....	....	3	3	....	....	7	10
st Washington Infantry (12 companies).	....	....	1	2	....	....	....	....	....	3	3	....	....	9	12
st Wyoming Infantry (4 companies).	....	....	....	1	....	....	....	....	....	1	1	....	....	2	3
Total	3	7	15	23	1	1	3	3	22	78	40	11	31	398	480

Ambulance service.—At Camp Merritt no ambulance company was organized or reasons sufficiently apparent. The necessary transportation of the sick at hat point was accomplished by means of ambulances under control of the surgeon n charge of the field hospital.

Upon arrival at Cavite, however, one company was formed, Capt. F. R. Keefer, sistant surgeon, United States Army, being placed in charge thereof. He had vith him 3 volunteer assistant surgeons, 4 hospital stewards, and 50 privates of he hospital corps. During the ten days between the formation of the company and he attack on Manila the officers of the organization were engaged in the instruction f their men in the methods of rendering first aid to the wounded and in the best nanner of transporting them to the hospitals with the means at our disposal. he means of transportation consisted of two ambulances and about forty quilez nd carromattas, the latter being supplied by the Quartermaster's Department the ay before the assault on Manila. The ambulances could not be used on account f the lack of animals strong enough to pull them through the mud and well-nigh impassable roads. It was therefore necessary to depend entirely upon the latter. They served their purpose fairly well, however. On the 13th of August the wounded were removed to the brigade hospitals with dispatch and in a generally satisfactory manner, though the vehicles used were not ideal means for the transportation of wounded. The litters, two in number, were placed on the top of the carriage box of the carromatta from front to rear, the legs being on the inside of the box, and thus preventing the litters from sliding out of their positions. In this manner we conveyed the wounded who required transportation in the recumbent posture, except those seriously injured, whom we could not trust to the jolting carromatta and had to carry the entire distance by hand litter. The quilez is a two-wheeled vehicle, with a covered top and two seats placed at the sides and facing each other, and a narrow seat in the front for the driver. It is drawn by one horse.

After our arrival in Manila the ambulance company was stationed near the division hospital, being engaged in the transportation of the sick from the regiments and in the outside police of the hospital. But as our sick list rapidly increased, and another hospital became necessary, the members of the company were gradually absorbed for hospital duty, and the transportation of the sick has since been accomplished by the hospital corps of the present First Reserve Hospital. This arrangement has been found satisfactory.

Transport service.—Twenty vessels were employed to transport the Eighth Army Corps to the Philippine Islands. Nine of these made two trips and eleven one trip. Of the latter, one, the *Scandia*, carried only 166 men from Honolulu, of whom 130 were members of the hospital corps. It may therefore be stated that 29 vessels were actually needed to transport the troops of this command, numbering altogether 887 officers and 21,575 enlisted men, or an aggregate of 22,462.

The vessels employed were ordinary ocean going passenger steamers, slightly modified in their interior arragements to meet the requirements of the troops. Before sailing from San Francisco they were inspected by a board of medical officers, who examined into and reported upon the number of men to be carried, the cooking and messing arrangements, bathing facilities, lavatories and water closets, and the sanitary condition of the ship generally, and her adaptability for the purpose intended. On the recommendation of this board the ships received a thorough cleaning and overhauling, and those which gave a history of recent infection were disinfected with formaldehyde. To the care taken in the preparation of the vessels is doubtless to be attributed the remarkably good health of the troops during the long voyage, and the small mortality, only 12 dying out of the number transported.

During the voyage itself the greatest care was exercised by the medical officers present to preserve the health of the men. Bathing was regularly insisted on, though the facilities in this direction were inadequate on many of the ships, which made it necessary to provide various temporary expedients. Bedding was aired daily, weather permitting, and on the vessels on which vermin made their appearance steaming of the underclothing of the men was very thoroughly carried out. The cleanliness of the ship received very careful attention. The old guard was used for police duty. Once each day the decks were thoroughly flushed and scrubbed, and after every meal they were carefully swept and all refuse thrown into the sea. Daily inspections were made by the commander of the troops, accompanied by the surgeons, and all insanitary or defective conditions were at once remedied as far as the means at hand permitted.

Still, while the health of the troops was remarkably good during the journey, and while they arrived in the Philippines in excellent condition and high spirits, the discomforts uncomplainingly endured during the long trip were many and serious.

With the nation calling for active operation on the part of the Army, the desire to send as large a body of men to the Philippine Islands at as early a date as possible could not be resisted. The result was a good strain on all departments and hardly sufficient preparation of the transports. On some of the vessels the bunks had not been placed in position at the time of the medical inspection; on others they were found to be unsatisfactorily arranged. The board recommended that they should be of the folding variety, and that they be placed in rows two abreast and three high. This recommendation it was impossible to carry out, owing to the limited time available. The consequence was that on many of the ships the men had to creep over two or even three of their fellows in order to reach their own bunks. In some cases, also, more men were placed on board than the number designated by the board as the capacity of the vessel; in others an insufficient number of bunks were provided for the number of men to be carried. Arrangements had therefore to be made during the voyage for these extra men; but as many of them slept on the deck every night, the lack of bunks probably did not result in any great hardship.

In my judgment, bunks made of lumber and stationary are an unsatisfactory arrangement for sleeping purposes on board a ship. Canvas hammocks are decidedly to be preferred. The wooden stationary bunks do not permit of a thorough cleaning of the berth deck, nor a complete inspection of the vessel. The hammock, on the other hand, may be taken down during the day, affording space for gymnastic exercises, so necessary during this trip, and of which the troops of this command were almost entirely deprived, owing to the lack of space. The hammock can also be removed to the deck, aired, and dried, a very necessary sanitary measure, in view of the fact that the berth deck of a vessel is usually more or less damp at all times.

I also disapprove of mattresses of every description. The vessels in our service were provided with bed sacks filled with straw at San Francisco. These were uniformly thrown overboard after leaving Honolulu, becoming damp, filthy, and were found to breed vermin. The use of hammocks will render them unnecessary. The cooking and messing arrangements were carefully looked into by the medical board. In most cases the ships were found deficient in galleys and utensils for the number of men the vessel could carry. Suitable recommendations were made in each case, sometimes for additional galley, always for additional utensils. Nevertheless, the surgeons accompanying the troops uniformly reported that facilities were still too limited. Much of the difficulty arose from the inability of the civilian cooks employed by the Government to handle the army ration with economy and to the best advantage. But no doubt some of it was due to actual deficiency in galleys and utensils. I believe transports should also be provided with hanging tables for the serving of food. They can be thoroughly washed and raised to the ceiling after meals, and would prevent fouling of the deck. In this matter the conveniences were extremely limited on the vessels in our service.

The ration is reported to have been of good quality, except in a few instances, where potatoes and onions rapidly decayed. Food was sufficient, though not always well cooked and neatly served. Potatoes and onions, when kept on the deck and protected from rain, can be carried the entire distance without serious deterioration. Fruits are much in demand, and in this connection it may be remarked that the Commissary Department should have constantly for sale to officers and enlisted men canned fruits of great variety. The hasty loading of the vessels, and the consequent jumbling together of stores, sometimes prevented the sale of the necessary canned goods on the trip to Manila.

The water supply for drinking and cooking purposes was adequate on all the ships in the service. A large supply was carried in tanks filled in San Francisco and again at Honolulu. In addition, each vessel was provided with a condensing apparatus, with a capacity sufficient in most cases to supply the necessities of the troops without drawing on the tank supply. The water was of good quality. In only one instance was it reported suspicious on account of faulty storage. No case of disease can, however, be attributed to its use. Ice could not be made in sufficient quantity to cool the drinking water, and when it is remembered that in the Tropics water has naturally a very high temperature, it may be readily conceived that it was extremely unpalatable, besides being a favorable medium for the development of disease germs.

That vessels intended for transport service between San Francisco and Manila should be provided with ample bathing facilities it is unnecessary to remark. That ours were inadequately provided in this respect is a fact. The large canvas tubs furnished the vessels at San Francisco on my recommendations were excellent where the supply of water was abundant and unintermittent, but they were not liked by the men when the water could not be frequently renewed. The shower bath is therefore to be preferred. Many of our vessels had excellent shower-bath arrangements; on others the means served well enough, while on some they were so defective and insufficient that temporary arrangements had to be provided during the voyage. There should be at least ten shower baths for 1,000 men, as frequent bathing is an absolute essential in tropical latitudes; and on board ship, where space is a consideration, the shower bath is the best and most cleanly and desirable.

In the matter of water closets, urinals, and lavatories, the vessels in our service were sometimes excellently, but more often inadequately, provided. On nearly all temporary additional latrines were put in at San Francisco, and served their purpose admirably. But a sufficient number was not, in many instances, furnished. There should be at least 20 seats to meet the necessities of 1,000 men, and if the space can be found for more so much the better. On many of our ships long lines of men were often compelled to wait their turn in the use of the closets, a necessity which in my estimation is not conducive to health.

Some of the vessels in our service were admirably provided with space for hospital purposes. On others, however, the arrangements were nil. The hasty preparation of the vessels and the necessity for their early departure prevented the making of extensive alterations in the interior of the space allotted for hospital purposes, where such space was actually set apart, which was rarely the case. Temporary facilities had therefore to be provided during the voyage, which, though unsatisfactory on account of the lack of room and improper arrangement of the bunks, etc., served the purpose fairly well. About 30 beds should be allowed for 1,000 men, and the hospital corps should be provided for elsewhere in the vessel. A small room for dispensary and another for operations should not be forgotten. Our facilities in this direction were absolutely insufficient.

Hospitals.—Almost my first official act after arrival at San Francisco was the establishment of a field hospital at Camp Merritt A location was secured on Point Lobos avenue in a large vacant square, in the immediate vicinity of the camp, and here tents were erected and floored as occasion demanded. Major Owen was put in charge of the hospital and soon had it in working order. Major Morris and Lieutenant Page were also on duty there during June, and two assistant surgeons were temporarily detailed from volunteer organizations. All men enlisting for the hospital corps were sent to the hospital for instruction and duty, as well as those transferred from the regular establishment.

At the time of my departure from San Francisco the institution had some 150 patients, about 100 being measles cases, for whom tent wards had been put up about 100 yards in rear of the others. It was at that time well provided with everything essential for the treatment of the sick. Folding cots, with woven wire bottoms, blankets, pillows, etc.; were abundant, and medical and other supplies were sufficient and obtainable on short notice.

Too much can not be said of the officer in charge of this institution—the only field hospital it was found practicable to put up at the camp—for his untiring labors, not only in perfecting the many details of hospital administration, but in uniforming, equipping, and instructing the hospital corps.

Upon arrival at Cavite, P. I., I found that Captain McVay, of the Medical Department, had secured two buildings—one in the arsenal and another in the town at Cavite, and these were being used for hospital purposes. Together they could accommodate about 150 patients, and though not perfect in their sanitary arrangements, were at any rate better than tents, especially at that season of the year, when there were daily pours of rain of enormous volume. At the time of my arrival these buildings contained 50 sick, and as it was found convenient and desirable to land all patients arriving on transports at this place, the number soon increased to 150. The third fleet of transports arrived at Cavite July 31, and brought a considerable number of sick, for whom hasty preparations had to be made at the hospital. For a few days there was consequently an unavoidable shortage of cots. A considerable number of bamboo cots, formerly used by the Spaniards, were however quickly furnished, and medical and hospital supplies being landed from the transports, the establishment was very soon in a condition to efficiently care for the sick. There was at no time a shortage of absolutely necessary supplies.

Captain McVay continued in charge of the institution until the 7th of September, and I fear that the excessive labors imposed upon him there, together with the general insalubriousness of the locality, were the causes of his untimely death, on January 5, 1899. Perhaps it may not be out of place here to express my professional opinion as to the length of military service in the Philippine Islands. From sufficient experience I know that Americans are not as a rule able to endure this climate for a longer period than two years. Climatic diseases and the great enervation due to excessive heat combine to render a longer stay here dangerous to the service and to the individual.

On July 25, the date of arrival of the headquarters in Manila Bay, the nucleus of a field hospital had been put up at Camp Dewey by Major Crosby. At the earliest opportunity I forwarded to the camp fifty hospital tents, which I brought with me on the Newport, together with a number of Hunt ovens, as well as other hospital and medical supplies that had arrived on the third fleet. I also directed the establishment of two brigade hospitals at the camp. My reasons for preferring two brigade hospitals instead of one division hospital were, first, that the arrival of more troops from San Francisco might at any time result in the formation of two divisions, and it would thus only be necessary to enlarge the brigade hospitals to transform them into divisional organizations, and, second, should brigades be detached to operate as separate commands it would be less difficult to send the brigade hospital along without confusion.

Between the 1st and 13th of August the First Brigade hospital was gotten ready for the reception of sick and wounded, the Second Brigade hospital (Crosby's) having received all the sick and wounded up to that time. About 100 hospital tents had been provided, but all of them were at no time needed at the camp. Wards were made by placing two or even three tents, end to end, in a row. Separate tents were erected for operating rooms, and altogether the brigade hospitals were well prepared and equipped in every detail for the work at hand. Major Crosby was in charge of the hospital for the Second Brigade, and Major Penrose of that for the First Brigade, and I cheerfully testify to the efficiency of both these officers. The 47 wounded brought to the institutions on the 13th of August received immediate and very careful attention. Indeed, I have reason to be highly gratified at the expeditious manner in which the patients were handled on that day, not only at the hospitals, but also on the firing line and at intermediate points. There was not a single instance in which the wounded did not receive prompt and skillful attention.

Upon the fall of Manila the brigade hospitals were removed to Manila into a building formerly used by the Spaniards as a military hospital. Here they were combined into one institution and under one management. This building has been described in other reports and a ground plan furnished your office.

The hospital opened later in Ermita, and used for convalescent cases only, has also been described, but I forward herewith a photograph of the same as a further illustration.

Medical and hospital supplies.—When Captain McVay left San Francisco with the first fleet he took with him a set of field equipments of the kind in use before the war. The volunteer regiments on the same fleet had no chests of any description nor any hospital equipments, but were otherwise well supplied with stores. After I arrived in the city the following plan was adopted in equipping departing regiments: First, they were supplied with medical chests and field desks; second, they were given one month's supply for use on the transport; third, they received a supplementary supply for six months.

Pages 1 to 6, inclusive, of the field supply table were used for quantities.

One brigade hospital supply was shipped on the second fleet, and upon arrival at Cavite was stored and issued, as occasion required, by Captain McVay. Two brigade hospital supplies were shipped on the third fleet, and were available for the troops at the time of the assault on Manila, so far as it was possible to land them. The cots, bedding, and dressing materials in these brigade supplies were all sent to Camp Dewey, and I must remark that the small quantity of dressings they contained gave me considerable concern. Fortunately I was able to purchase some material suitable for bandages and dressings, and soon after reaching Manila, the fourth fleet having arrived with two additional brigade supplies, I was able to meet every necessary want of the troops.

It may be remarked here that we had the greatest difficulty in getting our supplies landed. It was only by the most strenuous exertions on the part of Major Penrose that we were able to land sufficient cots, bedding, and tents to equip the brigade hospitals at Camp Dewey. The trouble continuing after our arrival in Manila, I addressed the following urgent letter to the Adjutant-General, in hope that the department might secure a tug for its exclusive use:

"In connection with so much of my communication of the 25th instant (August) as relates to the procurement of a tug and cascoe, I beg to add further that there is urgent need of such a tug. Transports are frequently arriving whose many sick must be conveyed to the hospitals. Numerous barracks are situated upon or close to the banks of the river, and the sick from these requiring hospital treatment must be similarly transported. Medical supplies, medicines, special foods, etc., are upon the transports for weeks after they reach the harbor before they can be brought ashore. Many of the sick are lying upon the floor of the hospital wards because the Quartermaster's Department has found it impossible to quickly furnish transportation, though cots, mattresses, and bedding are upon the ships.

"With a launch under control of the Medical Department, and in charge of the ambulance service, both sick men and supplies could be conveyed to the hospital without delay.

"Trusting that something can be done to relieve the present stringency of transportation, I remain, etc."

As a result of this communication a small launch, the *New York*, was turned over for the exclusive use of the department, and has been under our control since that time. Naturally it has been of the utmost service. It is used in conveying the ice from Cavite to Manila, medical and other hospital supplies from Manila to Cavite, and sick from transports to hospitals and from hospitals to returning transports. No unimportant use to which it has been put is the carrying of convalescents around the bay for the benefit of air and change. It is too small to go to

Corregidor, and consequently for the conveying of sick and supplies to that point we are obliged to depend upon the Quartermaster's Department, but the service at this time is excellent.

As a general statement about supplies, it may be said that there have been no complaints of deficiency. I have been able to meet all absolutely necessary wants of the troops. Only in the matter of cots and mattresses has there been a shortage, and only for a short time, since we were able to get a considerable number of bamboo beds, formerly used by the Spaniards in their barracks. The arrival of Major Corbusier on September 26 with a large supply of spring-bottom cots made the use of the Spanish beds no longer necessary. Mattresses and bed linen are essential, although a blanket spread over a bamboo cot provided with a pillow is fairly comfortable. The cots with woven-wire bottoms are, however, greatly to be preferred. In closing this subject I beg to state that the field supply table, had we been required to confine ourselves to it, would not have been sufficient for troops operating in the Philippines. The medical officers were therefore well pleased upon learning that the Surgeon-General did not limit us to it.

Sanitary recommendations.—The sanitary recommendations made by me have always received the most favorable consideration by the commanding general. Usually they were published in orders or circulars. Of these I append copies. By reference to my circular dated July 25, 1898, paragraph 44, it will be noticed that brigade surgeons were directed to make bimonthly inspections and reports of the sanitary conditions of their commands. I forward copies of the most important of the reports made under this direction.

In concluding this report I desire to bear testimony to the general high efficiency of the medical officers of this corps. I do not know of a single surgeon, volunteer or regular, who has not performed his duty in a manner that should meet with the satisfaction of the Government. They have always been ready to respond in time of need, and have at all times cheerfully carried out my wishes and instructions. While the volunteer medical officers are not all equally good administrators, I am glad to say that the professional qualities of all are of the highest character, and they have always fully appreciated the responsibility that rested upon them. I forward herewith a communication addressed to the Adjutant-General of the Department under date of August 25th, naming those surgeons and members of the Hospital Corps who, in my judgment, deserved special mention for meritorious services:

HEADQUARTERS DEPARTMENT OF THE PACIFIC AND
EIGHTH ARMY CORPS,
CHIEF SURGEON'S OFFICE,
Manila, P. I., August 25, 1898.

SIR: In obedience to your telegraphic instructions of the 23d instant, I have the honor to recommend the following medical officers and enlisted men as deserving special mention for meritorious service during the campaign ending in the fall of Manila, with a brief résumé of the services performed:

For promptly establishing dressing stations in total disregard of personal safety, and for efficiently caring for the wounded brought to him August 13, 1898: Acting Asst. Surg. F. H. Titus, United States Army.

For extraordinary display of energy and activity in conveying wounded to the rear August 13, 1898: First Lieut. L. P. McCormick, assistant surgeon, Tenth Pennsylvania Infantry.

For unusual activity, energy and efficiency in the organization of brigade hospitals and for unremitting attention to the wounded brought to them: Maj. W. D. Crosby, brigade surgeon, United States Volunteers; Maj. G. H. Penrose, brigade surgeon, United States Volunteers.

For unusual courage under fire August 13, 1898: Acting Hospital Steward Frank Hemsted, Hospital Corps, United States Army; Private Raleigh L. Netherton, Hospital Corps, United States Army.

For excellent service under fire of the enemy August 1, 1898: Capt. H. E. McVay, assistant surgeon, United States Army; Capt. P. J. H. Farrell, assistant surgeon, First California Infantry; Capt. A. P. O'Brien, assistant surgeon, First California Infantry; First Lieut. John Coffin, assistant surgeon, Tenth Pennsylvania Infantry; Hospital Steward George McIlwain, Tenth Pennsylvania Infantry; Private Emmett M. Fowler, Hospital Corps, United States Army.

For excellent service under fire of the enemy August 5, 1898: Hospital Steward Walter E. Talbot, First Nebraska Infantry; Private George H. Laidler, Hospital Corps, United States Army; Private George Blanchard, Hospital Corps, United States Army.

For excellent service under fire of the enemy August 13, 1898: Hospital Steward Charles E. Farrier, First North Dakota Infantry; Hospital Steward Walter E.

Patten, First North Dakota Infantry; Private Donald McIntyre, Hospital Corps, United States Army; Private Thomas McLarin, Hospital Corps, United States Army.

For unusual attention to the wounded on the night of August 1, 1898, and for efficiency on their subsequent transportation to the field hospital during a severe storm and over almost impassable roads: Maj. W. H. McCarthy, surgeon, First California Infantry.

For faithful attention to duty on the eve of the battle of August 13, 1898, while being intrusted with the delivery at Camp Dewey of certain important medical and surgical supplies, and for accomplishing his errand in spite of a terrific storm and almost impassable roads, with the further necessity of passing the night on guard in the mud and storm: Private John Fox, Hospital Corps, United States Army.

For discharging their duties in a thoroughly efficient and more than usually meritorious manner during the campaign ending in the fall of Manila: Maj. R. J. Fitzgerald, surgeon, Thirteenth Minnesota Infantry; Maj. L. H. Kemble, surgeon, First Colorado Infantry; Maj. F. H. Snyder, surgeon, First Nebraska Infantry; Maj. G. N. Neff, surgeon, Tenth Pennsylvania Infantry; Capt. F. R. Keefer, assistant surgeon, United States Army; Capt. P. F. Straub, assistant surgeon, United States Army; Capt. Sanford Whiting, assistant surgeon, Second Oregon Infantry; Capt. C. S. Locke, assistant surgeon, First Colorado Infantry; Capt. A. A. Law, assistant surgeon, Thirteenth Minnesota Infantry; Capt. N. M. Black, assistant surgeon, First North Dakota Infantry; Capt. J. M. Cabell, assistant surgeon, United States Army (retired); First Lieut. J. L. Conant, assistant surgeon, First Idaho Infantry; First Lieut. H. P. Ritchie, assistant surgeon, Thirteenth Minnesota Infantry; Acting Asst. Surg. G. W. Daywalt, United States Army; Hospital Steward Robert Miles, Thirteenth Minnesota Infantry; Hospital Steward Austin Ward, Thirteenth Minnesota Infantry; Acting Hospital Steward George H. Shelton, Hospital Corps; Private Fred Andrews, Hospital Corps, United States Army; Private George Bland, Hospital Corps, United States Army; Private Cyrus A. Dolph, Hospital Corps, United States Army; Private Callistus L. Edwards, Hospital Corps, United States Army; Private John Gill, Hospital Corps, United States Army; Private William Hayes, Hospital Corps, United States Army; Private Alexander W. Smith, Hospital Corps, United States Army; Private James H. Weller, Hospital Corps, United States Army.

For great efficiency, untiring and unusual zeal in promoting the welfare of the sick and wounded: Maj. H. W. Cardwell, chief surgeon, United States Volunteers.

Very respectfully,

HENRY LIPPINCOTT,
Lieutenant-Colonel and Deputy Surgeon-General, United States Army,
Chief Surgeon.

The ADJUTANT-GENERAL, DEPARTMENT OF THE PACIFIC,
Manila, P. I.

The following is the text of the sanitary circular issued to the Eighth Army Corps by Lieut. Col. Henry Lippincott, United States Army, chief surgeon:

SANITARY CIRCULAR FOR INFORMATION OF THE COMMAND, ISSUED BY AUTHORITY OF THE MAJOR-GENERAL COMMANDING, FOR THE OFFICE OF CHIEF SURGEON.

During the civil war for every man killed by bullets there were two who died, and probably five who had their health permanently destroyed by camp diseases, which we now know are preventable. We expect to prevent a repetition of this slaughter by modern sanitation, but it is positively impossible to do this without the cooperation of each soldier, who must be made to understand the necessity of obeying simple rules of health. Company commanders must see that each of their men is properly instructed in the following general rules and the reasons for them, that the rules are enforced, and that each man must be plainly told that if, through his own ignorant recklessness he becomes sick, he is a load on the Army, and weakens its fighting strength by that much, and is committing a serious offense. Every man in these small expeditions is positively needed, and must not be allowed to make himself sick.

All these preventable diseases are due to living germs, which flourish in tropical countries like all other plants which require warmth. Hence, special care must be taken in the tropics. There is positively nothing in tropical countries which need injure the health if we do not become infected, and the heat can well be borne by attention to simple rules. As long as we are healthy we can resist many germs which enter the body, but the instant our strength is reduced by careless living we become their victims. Hence, if we keep as well as possible there is less to fear. Ignorance of these facts has destroyed the health or lives of nearly 100,000 Spanish soldiers in Cuba in three years. In the last Turkish war, though only 1,000 Turks were killed in battle, 19,000 are said to have died of disease and 22,000 were sent home sick, of whom 8,000 died, and this was due to the same ignorance of these facts as to health. These were unnecessary deaths.

General rules.—Avoid everything which your own experience and knowledge have proved to be harmful to you. Excesses of every kind are far more harmful than at home, particularly alcoholic excesses. Heavy drinkers are usually killed by yellow fever and similar tropical diseases, where the temperate may recover. The ordinary barroom drinking is the worst. Tea and coffee are the only stimulants you will need, and no man fit to carry a gun needs alcohol in any form, even in moderation.

Baths must be taken once a day, either in the morning or evening, but never when exposed in the heat of the midday sun. Bathing in stagnant pools or bad water is very dangerous. If bathing is not possible, the body should be well rubbed twice a day with a wet towel to remove the foul excretions on the skin which decay so soon.

The feet.—The care of the feet is most important. They should be kept dry, if possible, and on the march bathe morning and night. The surgeon must be consulted the instant the feet become chafed or sore. Sweating feet are the cause of much inefficiency, and can be cured by the surgeon. For tender feet a little powdered starch in the socks affords much relief.

The hair.—The hair and beard must be kept short, for they can not be kept clean, and they give rise to much disease.

Food.—The plainer the food the better it is for you. Baked bread, fresh meat, fresh vegetables, and fresh fruits are all necessary and will be supplied whenever possible. Fresh ripe fruit is particularly desirable, but unripe fruit or decayed fruit are often deadly. The former is indigestible and so irritates the bowels as to make it easy for disease germs to cause fatal dysentery afterwards, and is far worse than green fruit in colder countries. Decayed fruit itself in the tropics may contain germs which cause fatal diseases. Unpeeled fruit must never be eaten, for the fruit may have been handled by natives suffering from infectious diseases, and the exterior of the fruit skin badly infected. Eat slowly, and, if possible, rest a while after each heavy meal. In the tropics it is harmful to work in the night air on an empty stomach, and the guard should, if practicable, keep bread and hot coffee on hand for men who are going on post at night. When greatly fatigued it is highly dangerous to eat or drink heartily. Indigestible food lays the foundation for all bowel infections, and it is better to go hungry than eat any food the least decayed. The native hogs have such filthy food that fresh pork is to be absolutely prohibited.

Water.—The most fatal of tropical diseases come from infected water, which, in Cuba, in 1897, destroyed nearly 20,000 soldiers. If the water is boiled fifteen minutes it is safe. Never drink water from an unknown source, as a pool or small stream into which sewerage may have entered. Stagnant water is, of course, the worst. Distilled water is safest. Ordinary filters are dangerous, as they clarify the water but do not keep out the germs. Clear water is not always the best, because it may contain germs that are deadly. Muddy water, free of germs, is harmless. A good spring is the best natural water. It is well to drink plenty of weak tea or weak coffee, which is harmless and keeps us from drinking too much unboiled water. When exposed to great heat, water in small amounts will have to be taken quite frequently to take the place of the perspiration and to keep the kidneys active. This alone may prevent sunstroke, as it prevents the blood from becoming thick from loss of water. Soldiers drinking unauthorized water should be severely dealt with. The canteens on a march had better be filled with weak tea or coffee than water.

Experience shows us that smoking in the heat of the day increases thirst and leads to excessive and unnecessary drinking.

Clothing.—A light, part woolen undershirt is necessary, for cotton is dangerous. Cotton drawers are the only ones comfortable, and are perfectly safe; but the body must be protected from sudden changes of temperature by the undershirt. Clothing must be loose and comfortable. When wet with sweat or rain, it should be changed as soon as possible, rubbing the body briskly with a towel. If it is impossible to change wet clothing, you should keep active until it is dry. To sit in a draft would be especially wrong, and this simple, well-known rule must be constantly in mind, for the body is almost constantly covered with perspiration, and the chances of getting chilled are innumerable and give the start to serious diseases.

Waterproof coats of rubber (Mackintosh) are highly dangerous, as they confine the body heat so that overheating is the rule, the body being "steamed" in its own sweat. The subsequent chilling is apt to be dangerous, and the overheating itself will produce fever. No matter how good these coats are in colder climates, they are utterly to be condemned in the tropics. It is better to be soaked in the rain. The poncho is less objectionable, but it, too, will be found unbearably hot.

All bedclothing should be thoroughly aired every day, and exposed to the sun at least two hours whenever practicable. As sunshine is a powerful disinfectant, it will destroy any infection accidentally introduced into camp. Sweat-soaked underclothing should be treated in the same way. "Keep the head cool and the feet dry," is a good motto, but to keep all clothing and the houses or tents dry is just as important. No germs can gain a foothold where everything is dry.

Sleep.—A sleep or rest after the midday meal (siesta) is almost a necessity in hot climates. It not only keeps us out of the worst heat, but supplies the sleep which can not be obtained at night. Most of the work will be done in the early morning and late evening, and sufficient sleep can not be obtained at night. Everyone should try to sleep a total of at least eight hours daily. No matter whether there is needed any bed covering or not, the body must be protected from chilling, for much sickness results from chilling in the sleep. Never sleep in damp clothing.

No one should be permitted to sleep on the ground; he must be at least 4 feet (preferably 6) from the ground. If troops are not billeted in houses, everyone should make special effort to construct sleeping platforms covered with tents. There is a very fatal form of malaria, and it is believed that sleeping on the ground is the best way of getting the infection from the lower layers of air near the soil. When military operations compel soldiers to sleep on the ground, the poncho is a necessity to protect from the dampness. It is also a good rule to have fresh leaves or straw put in every evening, but as these become foul and unsanitary soon they are dangerous unless removed daily and dried in the sun. Tents and houses must be freely ventilated at all times.

Heat.—It is the heat and not the sunshine which causes sunstroke; hence cases may occur at night. If the body be kept sufficiently cool, sunstroke is impossible. Hence, no work will be done in the heat of the day which can be done some other time. Military operations will have to be done at all times, and then efforts must be made to keep as cool as possible. Drinking water frequently and in small quantities, one-half a cup at a time to keep up perspiration and flush out the kidneys, is an excellent practice, though excessive drinking is harmful. The old rules given to soldiers in mild climates, not to drink water in the heat of the day or on marches or between meals, does not apply to the tropics. Drunkards and those in weakened health from other excesses are more apt to be sunstruck than the healthy and temperate. Everything which depresses the strength aids in producing sunstroke—i. e., bad ventilation, overcrowding, bad water or food or clothing, etc.

The relaxing heat usually makes the use of a suspensory bandage necessary. The perspiration and dust cause inflammation of the skin, which must be attended to by the surgeon; otherwise ulcers may result and take months to heal. The surgeon will supply a boric acid dusting powder to men who need it as a preventative.

The head must be kept cool, and never exposed to the direct rays of the sun.

Insects.—There is considerable evidence that in the tropics insects inoculate certain diseases into the blood. Mosquitoes have been accused of causing malaria, and whether it is true or not, it is wise to protect ourselves from them. Mosquito netting is desirable. Flies are believed to carry cholera, and certainly do carry filth on their feet. Everything which will lessen the nuisance of flies will certainly benefit, and nothing is better than absolute cleanliness. A few drops of ammonia rubbed on insect bites is the best remedy.

A small red insect, or jigger, which burrows in the skin, causes sores which require the surgeon's care. In the beginning, before it has burrowed deep, it can be picked out and all irritation ceases. The itch is very common, and is due to an insect. The surgeons can quickly cure these with tolu or sulphur.

Scorpions and centipedes cause poisonous bites which are never fatal. In a few hours all irritation is over.

Night air.—Night air is not harmful except in low malarious regions, and in them it is well to keep protected from the night air when not on duty, until well accustomed to the climate. A cup of coffee before going out on damp nights is a necessity.

Sinks.—The greatest care will be taken to keep the sinks from spreading disease. All human discharges are dangerous; anyone fouling the camp or its vicinity is committing a serious offense. The sinks should be covered with fresh earth three times a day.

Natives.—The natives are notoriously careless of all sanitary laws, and are infected with numerous diseases. Intercourse with them will be dangerous. Under no circumstances have any communications with suspected people, and thus avoid carrying infection to the camp. All kinds of venereal diseases are very prevalent among the natives in the towns.

Special diseases.—As typhoid fever, dysentery, and cholera are almost always carried by the water, the use of the proper water will prevent them. Diarrhea must be checked at once, and the sooner you report to the surgeon the better. This is most important. If the bowels are regular no laxatives must be taken, as none are needed. When exposed to a decidedly malarious atmosphere keep indoors at night. Five grains of quinine daily may be of use, but it is of no use whatever in any other circumstances for a healthy man. The surgeons will issue quinine when necessary. Avoid all drugs unless they are prescribed by a surgeon for some special object. Above all, do not take any quack "blood purifiers" or "spring medicines" to lower the vitality. Whisky is not necessary, and its routine use with quinine is vicious. Every case of sickness must be promptly reported to the surgeon, particularly every case of fever or diarrhea.

Seasickness can not be cured in most cases. It may be prevented in some cases by going on board in good condition. A heavy meal, or any excesses, or anything lessening the strength beforehand, may bring it on in a person who might have escaped. A laxative three days before embarking is excellent.

Company commanders will see that each sergeant reads this circular to his squad at least once a week for the next two months.

The report of Maj. Herbert W. Cardwell, chief surgeon Second Division, Eighth Army Corps, during the early period of the occupation of Manila, referred to by the chief surgeon of the corps in his report submitted above, is as follows:

In compliance with circular letter, dated Surgeon-General's Office, Washington, D. C., August 23, 1898, I have the honor to submit herewith a sanitary history of the Second Division, Eighth Army Corps, from its organization to the time of my transfer to the First Division, on September 8, 1898.

THE SECOND DIVISION.

Organized by General Orders, No. 2, headquarters of the Pacific and Eighth Army Corps, dated "Off Cavite, Manila Bay, August 1, 1898."

First Brigade.—Brig. Gen. Arthur MacArthur, United States Volunteers, commanding; Twenty-third United States Infantry (two battalions), 15 officers, 801 men; Fourteenth United States Infantry, 20 officers, 1,102 men; Thirteenth Minnesota Infantry, 36 officers, 901 men; First North Dakota Infantry, (two battalions), 29 officers, 642 men; First Idaho Infantry (two battalions), 28 officers, 643 men; First Wyoming Infantry (one battalion), 14 officers, 315 men; Astor Battery, 3 officers, 96 men.

Second Brigade.—Brig. Gen. F. V. Greene, United States Volunteers, commanding; Eighteenth United States Infantry (two battalions), 16 officers, 774 men; Third United States Artillery (four batteries), 9 officers, 741 men; battalion United States Engineers, Company A, 1 officer, 121 men; First California Infantry, 49 officers, 1,255 men; First Colorado Infantry, 43 officers, 952 men; First Nebraska Infantry, 42 officers, 906 men; Tenth Pennsylvania Infantry, 33 officers, 566 men; Utah Artillery, Batteries A and B, 7 officers, 335 men; detachment California Heavy Artillery, 1 officer, 50 men; Second Oregon Infantry, 41 officers, 997 men; signal detachment (not known).

Total, 387 officers, 11,202 men.

On the organization of the First Division the detachment of California Heavy Artillery was transferred to it, August 23, 1898.

Marches and journeys.—All troops from Cavite and transports were transported to Camp Dewey on "cascos" (flat-bottomed native lighters), on captured Spanish tugs, or on a small chartered transport, the *Kwong Choi.* The distance traversed across the Bay of Manila was approximately between 7 and 8 miles to the Paranocque River, between 8 and 9 to Camp Dewey, and about 5 to Bakor. Troops landed at Bakor had but little surf to contend with and made easy landings, but the road of nearly 5 miles to Camp Dewey was midleg deep in mud and practically impassable for quartermaster's trains. Troops were not able to land at Camp Dewey proper except on two or three days on account of the surf, and one casco, with Fourteenth United States Infantry on board, was overturned in the surf, with the loss of considerable property, but no loss of life.

The logical landing was at the Paranocque River, and here most of the troops and all medical supplies were landed.

A rather strong monsoon blew daily during the entire time of transfer of troops from Cavite to Camp Dewey, freshening at times to a gale, but always calmer in the early morning. Before 10 o'clock it would have been possible on practically every day to land troops safely and dry, but no case came under my observation where the quartermaster's department succeeded in getting towage for cascos till the wind had risen sufficiently to make the passage dangerous and the landing next to impossible. I saw troops stand fully equipped and ready to embark for nearly four hours at Cavite before a tug was secured, and saw the same troops return to Cavite, having been unable to land, when two hours before their arrival the bay was as smooth as a mill pond. At any time, and in almost any weather which prevailed at that time, any one of the many steam launches owned by the Navy could have taken in tow a casco brought to Paranocque by deep-sea tugs, and safely towed it into the river and smooth water. But the launches furnished for this purpose were absolutely worthless. To particularize: The chief quartermaster turned over to me at Paranocque on August 3 the launch assigned for this purpose, in order that I might convey an important message to the commanding general in Cavite. The launch reached the breakers on the bar, when the steam fell so low the propeller would not turn. We anchored and got up plenty of steam, turned back, and reached the river with the propeller turning occasionally, when assisted by hand. I was compelled to ride in a "caramata" to Bakor over roads where the driver and I had to take turns walking and lifting the cart out of holes; this for nearly four hours, and then to take a native canoe through a squall to Cavite. The trip of 7 to 8 miles occupied eight hours, which were precious, as it was necessary to arrive in Cavite in time to stop the dispatch of any medical stores to Bakor on account of impassable roads.

This criticism is made for the reason that this lack of proper landing arrangements caused nearly 50 per cent of the troops to arrive in their camp either soaked to the skin from a long wade in the surf, or with wet equipage, or both.

From Paranocque a march of 2 miles was necessary to reach camp, over a road which was fair at first, but became midleg deep in mud after a day or two's work by the quartermaster's trains.

Daily from August 1 to August 13 designated portions of the command marched about 2 miles to the trenches and the outposts, and on the conclusion of their duty marched back to camp. These marches were through the fields when they were not impassably flooded with water; otherwise, through the mud roads.

I have frequently seen men just returned from duty in the trenches rush into the surf in complete uniform, on the ground that they could not be wetter and could be cleaner of mud.

SANITARY CONDITIONS IN CAMPS—(1) CAVITE, (2) CAMP DEWEY, (3) MANILA.

CAVITE.—Troops quartered in barracks, in the public buildings, and in old prisons. These buildings were found reeking with filth and in a state of indescribable confusion and disorder from the thorough looting of the Filipinos. The ground level of the peninsula on which the arsenal and town of Cavite is situated is only a foot or two above high tide, and the soil is very porous; yet each of the daily rains leave the ground flooded with from 1 to 3 inches of water. The entire peninsula is a sand bank with a top soil of several inches consisting of the vegetable and animal débris of generations. One side is bounded by a back bay (Bakor Bay) of dead water without tide race, and the sea wall contains many recurrent angles designed for defense, but serving as catch traps for all the offal and garbage thrown in the bay on that side. The opposite side of the peninsula has a tide race, but the sea wall throughout its greater extent is composed of the walls of Fort San Felipi, made ground bordered with defunct boilers and machinery from the navy-yard, and casemates occupied at the date of the commencement of this report by about 2,500 Spanish prisoners in the hands of the Filipinos. The prevailing winds are from the direction of Bakor Bay, in which lie a portion of the destroyed Spanish vessels, the hulls of which contain the decomposed bodies of many Spaniards. This was evidenced by the seething and bubbling of the water which filled the ventilating shafts, and the presence of a stench which was plainly noticeable in Cavite.

There never was a sanitary drainage system in Cavite. The two or three modern closets found had the gas vents carefully sealed and discharged into sealed vaults, from which I have personally seen explosions of gas drive the trap water out over the room. There was one closet built over the sea wall with holes in the floor and blocks of wood to keep the feet of the men out of the surrounding filth. In the majority of the barracks, and in all the houses of the town, the fæces of generations had been carefully preserved in cemented vaults.

There were several more or less elaborate attempts at "improved sanitary drainage." For instance: In the palace within the Cavite Arsenal the officers' closets were modern porcelain affairs with a water flush, the water tank requiring to be filled by hand and, with no gas vent to the trap. Fæces, urine, and water collected in a vault until the level of siphonage was reached, when about two-thirds of the contents siphoned into a sewer, which emptied through the sea wall at the level of low tide into a recessed angle, where both wind and tide tended to retain all accumulations of filth. This sewer, only periodically flushed as it was, was connected by means of a grating in the floor with the inner court of the building, so that all sewer gas which was unable to enter the building by way of the closets entered by way of the courtyard. In other closets of the same class the siphon opened into a cesspool. The palace of the Governor-General had an expensive cement arrangement in which the rise and fall of the tide was expected to carry off the fæces through the medium of an open drain and a shallow "dissolving vault." There was an attempt at drainage of the surface water by the construction of stone underground drains, but these were in most instances clogged or broken in.

No meteorological reports are available, but personal observations show the temperature between 80° and 90° F., with daily thunderstorms of great severity; humidity evidently very great.

The streets in Cavite are narrow, unpaved, and overhung by low 2-story brick and stone houses. Ventilation in these houses is excellent except for the fact that any current of air from the rear of a house is laden with sewer gas.

The barracks were 1-story brick or stone buildings, with brick or board floors, except in Fort San Felipe, where the floors were raised about 4 feet from the ground. These buildings were dark from the overhanging eaves, but contained many windows, therefore had a free circulation of air. The floors, however, were damp, and our soldiers used the same cots of bamboo or rattan, elevated about 3 feet on iron supports, which had formerly been used by the Spanish soldiers. Cooking facilities were nil for our use. There were many brick ranges with small clefts or crevices over which the native oyers could be placed, which were satisfactory for native cookery and required but a few small twigs for fuel. Our Buzzacott and Hunt ovens required large quantities of firewood, which led to extensive foraging and destruction of buildings for fuel. The scarcity of hops, except such as could be borrowed from the transports by company cooks, and the difficulty of keeping yeast led to the almost exclusive use of baking powder in bread, the resultant article being unwholesome.

Water supply worse than bad.—Wells of surface water or seepage from the sea. Water brackish, filled with organic matter and bubbling with decomposition at the bottom. Tanks of rain water from galvanized roofs, but insufficient for large garrison,

Bathing facilities nil, except from rain water under eaves, or in bay, where large numbers of men were stung by rays.

Laundry facilities, native laundresses, who pound out the dirt with clubs in cold water and bleach clothes on the grass in the sun, furnishing abundant opportunity for transmission of skin diseases, if not graver affections.

Food.—Not at all fitted for this climate. The Government ration contained an excess of meat and a deficit of vegetable for this climate. After arrival in the Philippines, after a sea voyage from twenty-eight to forty days, the salt meat had palled on the men, and they craved vegetables. The vegetable diet necessary was not available from the commissary, and the men consumed vast quantities of native fruits, with resultant diarrheas and mango boils. Pineapples were especially dangerous in that they were usually peeled by the natives and exposed some time to the sun and flies before sale. The men craved and needed dried prunes and other American fruits, beans, rice, pease, oatmeal and cereals, and canned tomatoes, corn, succotash, etc. The salt-meat ration was in great part wasted, and need not have been issued except in sufficient quantities to produce cooking fat. The fresh-meat ration was difficult to procure, was issued intermittently, and, coming from refrigerator ships, could not be preserved longer than twelve hours. Its quality was excellent.

On the first expedition the savings on rations were not allowed to the men, but the saving to the Government was applied in payment of Government cooks, who were worse than useless, being incompetent, dirty, and not amenable to discipline. Such trifles as cooking corned beef and cabbage in the steam coffee tanks were sufficient to spoil the meals of an entire shipload of troops for days. Most of the complaints regarding life on the transports have been exaggerated or are positively untrue, but enough was true to cause men, on arriving on shore, to break through all rules of health and neglect all precautions which had been thoroughly and systematically impressed upon them.

Clothing.—The earlier arrivals suffered severely from the lack of suitable clothing, but the first issue of light-weight underclothing corrected this evil. This command has never been issued khaki uniforms, and the canvas fatigue suits, or overalls, were not fit for wear without underclothes until several washings had softened the texture. Many men were off duty from chafing caused by these harsh uniforms. When damp with perspiration of one or two days, they were filthy in the extreme. From personal experience I state positively that the most comfortable as well as neatest uniform for this climate, is that furnished by the Spanish Government to the Seventy-third Regiment of Jolo, consisting of an undershirt of white flannel, closely resembling the heavier outing flannel of the United States, made in the form of a jacket, light underdrawers, and white duck uniforms, with a belt. This uniform looks well with or without the blouse, and protects the blouse perfectly from perspiration. It prevents chilling and is never too warm. Add to this a khaki suit for fatigue, and the uniform would be excellent.

The campaign hat has proven to be much more satisfactory in this climate than was expected. During the wet season especially it is superior to any cork or pith helmet and is far superior to the straw hat usually worn here. The helmet, if furnished, should have a brim at least as wide as the campaign hat.

Habits of the men.—As a rule, excellent. It was difficult, however, to enforce policing among the volunteers. Regiments changing station usually left their quarters in a bad shape, and although as a temporary expedient, closets were built over the sea wall, it was difficult to prevent men with acute diarrheas from fouling the ground around the quarters.

Intemperance was rare, the greatest trouble with the men who were addicted to liquor being the use of a native gin or anasau. The physiological effects of this gin are different from that of any liquor I have seen, and in connection with Lieutenant Haynes, California Volunteer Heavy Artillery, late assistant professor of viticulture and olive culture in the University of California, I am preparing a special report on its composition and effect.

Personal cleanliness, considering the bathing facilities, was good. Cleanliness of clothing was not good.

CAMP DEWEY.—The camp was situated between the shore of Manila Bay and the Camino Real, or main road leading out of Manila. It was about 1 mile in length and 400 or 500 yards wide. The soil was a mixture of sand and loam, and very porous except for a strip nearest the shore where most of the officers and headquarters tents were located. There was a slight fall in the land from the Camino Real to the shore, which, with the porous nature of the soil, gave good drainage except in the heaviest downpours. The greatest part of the camp site had been under cultivation and planted in peanuts, which proved rather a benefit than otherwise, as it increased the porosity of the soil.

There was no opportunity for the consideration of any but the grosser sanitary questions in the selection of this site, as it was the only one on the Philippine Islands to which the army had access.

Water supply was much superior to that in Cavite. There were many native shallow wells, walled with stone, comparatively free from contamination, and furnishing an ample supply. Many organizations excavated new wells, sinking a barrel in the centre to prevent caving. Boiled, this water was free from objection.

Tentage.—Nothing but shelter tents were furnished, and organizations just arriving pitched these on the wet ground for the first night. As soon as possible thereafter the men in pairs would buy from the natives a framework of bamboo about 30 inches high, on which and over which the shelter tent made an apology for a covering. Ponchos thrown over all kept out part of the rain. In very heavy rains men stripped to the skin, put the clothing inside the tent, and stood outside till the storm was over. Officers', hospital, and office tents were thoroughly trenched, but no trench could absolutely protect against the sudden downpours, and on the night of July 31 the surgeons in attendance on the wounded waded about in 4 inches of water in the hospital tent.

Disposal of waste was by means of sinks. The only trouble with which was their tendency to fill with water.

Habits of the men.—Excellent. Hard work and interest in the campaign taking the place of any craving for morbid or immoral pursuits.

Surf bathing and bathing in the rain were universal and frequent.

Cleanliness of clothing was not so good, as it was almost impossible to dry clothes if washed.

Food.—Added to the general unfitness of the ration for the climate was scarcity of the supply from lack of transportation facilities. From the establishment of Camp Dewey until several days after the fall of Manila, but little more than half rations were available.

MANILA.—With a few exceptions for the worse, the general conditions were as described under Cavite. The city was filthy to an extreme, and the first attempts at cleaning were misdirected by some one, as vast quantities of filth were hauled out of cellars, backyards, and stables to be dumped in the moat about the walls, on empty blocks in the heart of the city, or along the borders of the famous driveway on the beach. Later, this was corrected by placing garbage in scows and dumping it at sea.

Water supply.—For some days there was no fixed supply except casual catchings of rain water, as the city waterworks were in the hands of the insurgents. Later, water was turned on and furnished in abundance for washing and cooking purposes, although the water is essentially bad, coming from an alluvial watershed and impounded for precipitation by gravitation only.

Barracks and buildings.—Troops were quartered in deserted Spanish cuartels and other public buildings, in warehouses, tobacco factories, police and fire stations, and cockpits. In the majority of cases these were in the filthiest of condition, with water-closet vaults full. In nearly every barrack there was overcrowding. It was difficult to find elevated beds or cots for so large a number of men, and many slept on the floors for days.

Clothing was better adapted to the climate, as issues of white suits were made as rapidly as possible.

Food was ample in supply after the first few days and the compulsory savings of the camp were invested in eggs and chickens by nearly every company. At date, November 25, 1898, every organization whose officers or noncommissioned officers have any experience messes satisfactorily.

Habits of the men.—Fair as a rule. The men, however, having become habituated to the repulsiveness of the native women sexual immorality is more common, with a notable increase in venereal disease. It is difficult to judge how much sexual disease there is in the command, as many volunteer soldiers apply to drug stores for relief, and do not report to the surgeon unless compelled to ask to be relieved from duty.

Sanitary recommendations.—The commanding general of this division has never been partial to the use of written communications where verbal ones would answer the same purpose. For this reason many of the reforms instituted are not a matter of record.

He has never disapproved of any measure calculated in any way to increase the health or comfort of the troops, and has done everything in his power to assist the medical department.

1. In the matter of a complaint from the surgeon of the Second Oregon Volunteers, regarding the use of water from a well within San Felipe fort at Cavite Arsenal.—Recommendation: That the commanding officer of Fort San Felipe be instructed to prohibit troops from taking water from the well except to wash the persons or clothing of Spanish prisoners. Action taken: Order issued.

2. Monthly sanitary report of the First Brigade, July, 1898.—Recommendations: That barracks be sprayed with whitewash, that only bona fide residents be allowed to live in Cavite town, and those under health restrictions, and that if a permanent post is established a complete and expensive sewerage system be constructed. Action taken: Recommendations approved; to be carried out as soon as practicable.

3. Letter to the chief surgeon of the department asking for an order from the general commanding the Eighth Army Corps on the following points: (1) The water supply of Manila is unfit for drinking purposes unless boiled. The original supply comes from a densely populated district, and is contaminated in every conceivable way. (2) The soda water vended on the streets is made from ordinary city water or worse, flavored and charged but not sterilized in any way. (3) The abdominal bandage, at least at night, is imperative. (4) Sleeping on the ground except as a military necessity, should be forbidden under pain of punishment. Action taken: A circular on the subject by the chief surgeon of the department was approved and published.

4. Verbal recommendations regarding the disposition of waste, the location of sinks, the enforcement of policing of tents and grounds, regarding habits of personal cleanliness, etc., were invariably accepted, proper and stringent orders issued, and every effort made to enforce them.

Organization of the medical department and hospital corps.—The first expedition to the Philippines was accompanied by seven medical officers with volunteer regiments, and one regular medical officer on duty with a battalion of regular infantry. This officer had in his care certain reserve medical stores intended for the acting medical purveyor on his arrival, but with authority to use in case of necessity. Immediately upon the arrival at Cavite Arsenal this officer, Capt. H. E. McVay, assistant surgeon, selected the best building available for the purpose and instituted on a small scale a post hospital, which, just previous to the arrival of the chief surgeon of the corps, was moved into larger quarters, and on arrival of the chief surgeon was designated a reserve corps hospital: and on the organization of the first division was designated as the First Division Hospital. The commanding general of the expedition assigned the senior medical officer present as acting brigade surgeon, and under his orders an assistant surgeon, a hospital steward, and sufficient privates from the hospital corps of the volunteer regiments were detailed to duty in the hospital. On the arrival of the succeeding organizations, the sick of the transports were transferred to this hospital, and additional stewards and privates detailed under emergency orders.

The medical officers who first arrived had practically no experience in anything pertaining to their duties, except the professional care of the sick and wounded. Up to the arrival of the chief surgeon of the department, many of them considered themselves as regimental officers solely, and when details were made for duties outside their organizations they responded and did the duty, but with the feeling that they were in a false position.

None of the first arrivals were supplied with blank forms, and records were kept on scraps of paper awaiting transcription.

The privates of the hospital corps were enlisted as privates in infantry companies among the volunteers, and were simply detailed by the commanding officer of the regiment for duty with the surgeon. It was not known that any authority existed for their transfer to the regular service, or that any way existed by which they might be given the benefit of hospital-corps pay. The forty-eight men, therefore, of the Second Oregon and First California regiments were mustered with their original companies, and received the pay of privates in the line until August 5, 1898.

About the time of the arrival of the chief surgeon, Camp Dewey had been established. Brigade surgeons, Majors Crosby and Penrose, had established their brigade hospitals in camp, and there was gathered about them by detail a corps of operators and assistants, and a sufficient number of hospital stewards and privates to do the work. At the same time an ambulance company was formed with three officers and fifty men. There was much misunderstanding among the volunteer regiments as to the status of these men. The stewards were members of the noncommissioned staff of their respective regiments. In many regiments there were no acting stewards warranted. The men had been transferred to the regular service, but there were no tents or utensils to allow of their being camped or messed together, and they were left with their former companies, reporting to the ambulance company officers for drill and instruction.

The headquarters of the Eighth Army Corps were on shipboard with little clerical facilities, and it was impossible to issue large numbers of copies of orders. Subsequent developments showed that one commanding officer of a regiment refused to recognize the transfer of these men, until he should receive an official copy of the order through the regular channel, and, in consequence, the hospital corps privates attached to that regiment were compelled by him to muster with their original companies and to accept privates' pay in the line up to September 1. Other commanding officers not only recognized the order for transfer, but immediately refused to ration these men, necessitating a lengthy order from the commanding general of the division, assigning them by name to certain companies for rations.

The personnel of the hospital corps was not, in my mind, a subject for congratulation. This was particularly apparent in the hospitals and ambulance company. A regimental surgeon called upon for a detail of twenty of his twenty-four men for detached duty, naturally retained his best men for duty with himself, and it took much time and energy to whip the others into shape. These various causes made it impossible to secure as good results as might have been expected from the number of men present. Without intending any comparisons, too much credit can not be given Capt. F. R. Keefer, assistant surgeon, United States Army, for the order he brought out of chaos, and the discipline he evolved from anarchy in the ambulance company. This company was maintained intact until after the fall of Manila, when it became necessary to detail its members for duty in the hospital. The men were well equipped with pouches, first-aid packets, and hand litters, but no ambulances were at hand, and would not have been available for use over the impassable roads if we had had them. The transportation of the wounded was accomplished by the means of the native "carromatas," two-wheeled carts drawn by diminutive ponies. It was fortunate that the extent of country to be covered did not exceed a section about 3 by 5 miles, and so intersected with roads that ambulance stations could be established along the route to the rear, as dressings, no matter how skillfully applied, were wrenched loose by the fearful jolting and switching of those most abominable vehicles over that execrable road.

Brigade Surgeon Penrose and the division surgeon were at the front all day, on August 13, and superintended the transportation over the entire line, replacing dressings frequently between the front and the ambulance stations, where they invariably required totally new dressings before going on to camp. I seriously contemplated at one time dismissing the carts, and having the wounded carried by hand, but found the road so full of pitfalls and bowlders that litter bearers were unable to keep their feet and would invariably have dropped their wounded. I greatly regret that my time was too fully occupied before the engagement to allow of the improvisation of travois litters from bamboo. I believe them to be the most suitable form of transportation for the wounded in this country. The fact that the brigade hospitals at Camp Dewey and the ambulance company were fairly well equipped on August 13 was due almost entirely to the personal efforts of Lieut. Col. Henry Lippincott, chief surgeon of the Eighth Army Corps. Having after constant effort succeeded, the day before the battle, in securing a casco for the transportation of supplies, this officer found it necessary to go personally into the hold of the transport *Newport* and assist in the breaking out of absolutely necessary supplies which were towed to camp and brought into the hospital in carromatas, many of them long after dark.

Sanitary aspects of engagements with the enemy.—There were engagements with the enemy on August 1, 2, 5, and 13, with resultant casualties, but the sanitary aspects of all were practically the same. The troops marched through mud and water to their places in the trenches, and were alternately roasted and basted by the sun and rain. To the trenches the men carried canteens of tea or coffee, and boilers to boil water, but on the entry to the city of Manila this was impossible, and the men drank eagerly of water which was handed them along the roads by the natives. On arrival in Manila many organizations secured shelter at once, but many men, including the officers and men on outpost duty, slept on the sidewalks or under the eaves of houses, and the majority of the troops were wet for several days.

HONOLULU, H. I.

On the arrival of the First New York Infantry and the Third Battalion of the Second United States Volunteer Engineers in Honolulu, in September, 1898, a post hospital of forty beds was established. It was soon discovered that this hospital was inadequate for the wants of the garrison and the care of the sick men from transports touching at the port. As the location was found to be malarious, and to be unsuitable in certain other respects, ground was rented in Buena Vista Park and a hospital of 100 beds was promptly constructed. This acts as a post hospital for the present garrison, consisting of four batteries of the Sixth Artillery, but its main object is to provide for the treatment of serious cases from transports en route across the Pacific. It has ample supplies for any emergency that may arise, and its capacity can be largely expanded by erecting tent wards on the grounds.

THE DIVISION OF CUBA.

In order that the military authorities might fully understand the great danger to which our troops would be exposed during a summer campaign in Cuba, I laid before the Secretary of War as early as March 25, 1898, the prominent facts concerning the prevalence of yellow fever in that island. In the communication which follows I directed particular attention to the ports of entry which are known to be permanently infected and to those seaports and inland towns in which the disease prevailed only when the infection was imported under certain conditions favorable to its spread.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, March 25, 1898.

SIR: In view of the possibility of war with Spain and of military operations in Cuba, I have the honor to invite attention to the following facts relating to the prevalence of yellow fever in that island. The data given are taken principally from the report of the Havana Yellow-Fever Commission of 1879, of which Prof. Stanford L. Chaille, M. D., of New Orleans, was chairman and I was a member:

TEMPERATURE.

This is conceded to be the climatic element of greatest importance, and the "annual mean" to be the chief factor. Throughout the West Indies the mean annual temperature near the sea is from 78° to 80°, the mean daily range is only about 6°, and the extreme annual range does not usually exceed 20°. At Havana the mean annual temperature varies in different years from 77° to 79°; the mean temperature of the hottest months, July and August, varies from 82° to 85°, and of the coldest months, December and January, from 70° to 76°. The minimum temperature is very rarely as low as 50° and the maximum as rarely exceeds 100°; in fact, the thermometer in the shade seldom rises above 94°. There are no records nor any traditions of frost having ever occurred except on December 24 and 25, 1856. It is alleged that even in the sparsely inhabited mountains in the east of Cuba, where the Tarquino peak reaches an altitude of about 8,000 feet, frost rarely occurs, and snow never.

RAINFALL AND HUMIDITY.

During the sixteen years, 1859–1874, the average number of rainy days at Havana was 113; the minimum number, 97 days, occurred in 1869, and the maximum number, 141 days, occurred in 1862. The average amount of rain for the sixteen years was 49 inches, the minimum was 42.5 in 1861, and the maximum was 70 inches in 1867. The maximum amount of rain falling in any one day was 8¼ inches on April 7, 1869. The so-called rainy season is from May to September, inclusive, but especially during August and September. The rain then descends with such rapidity that it runs off in torrents; but, as is seen, the usual belief that the annual rainfall is excessive is erroneous. The annual mean relative humidity varies in different years from about 73° to 74.5°, and that of the different months of the year from 66° to 79°; the minimum occurring in any day of the year may be as low as 34°, and the maximum as high as 96°. Evaporation is extremely rapid.

PREVALENCE OF YELLOW FEVER AT PORTS OF ENTRY.

1. Havana.—Annual prevalence since 1761, the chief center of infection, and most dangerous to the shipping.

2. Matanzas.—Annual prevalence certainly since 1828, and probably much longer; an important center of infection, but less dangerous to shipping than Havana.

3. Cardenas.—Annual prevalence certainly since 1836, and it was not founded until 1828. It is an important center of infection, but not specially dangerous to shipping, because of the distance vessels anchor from the shore.

4. Cienfuegos.—Annual prevalence since at least 1839, and it was not founded until 1819–1825. It is a dangerous center of infection, but, like Matanzas, has a very large harbor, and is less dangerous than Havana to the shipping.

5. Sagua.—Some cases of yellow fever occur annually, but vessels are very rarely infected, as these anchor several miles distant from the coast, and Sagua is 10 miles inland.

6. Baracoa.—Yellow fever occurs occasionally as an epidemic, but not annually as an epidemic.

7. Gaibarien.—Cases of yellow fever occur frequently, but not every year. Very little dangerous to vessels, as these anchor many miles distant.

8. Trinidad.—Annual prevalence certainly since 1838, and probably longer. The harbor is not believed to be specially dangerous to vessels.

9. Cuba.—Annual prevalence certainly since 1851, and probably very much longer. It is a noted center of infection, and its small harbor is very dangerous to the shipping. This, next to Havana, is probably the most dangerous place to shipping in the whole island.

10. Manzanillo.—Annual prevalence. It is in constant communication with Cuba, Trinidad, and Cienfuegos. As vessels anchor in the open sea several miles from shore they probably suffer little.

11. Neuvitas.—Annual prevalence. Vessels anchor a mile or more distant, and are in little danger.

12. Guantanamo.—Annual prevalence. The town is about seven miles from the harbor, and vessels are probably little exposed to infection.

13. Gibara.—Cases of yellow fever do not occur every year. Vessels anchor distant from the shore, and are in little danger.

14. Zaza.—Cases of yellow fever do not occur every year. Vessels are probably in very little danger.

15. Santa Cruz.—Cases of yellow fever occur in the majority of, but not in all, years. Vessels anchor far from shore, and are in little danger.

SEAPORTS WHICH ARE NOT PORTS OF ENTRY.

16. *Bahia Honda.*—Yellow fever is not endemic; is even said to be "unknown," and to present no cases, "either indigenous or imported."
17. *Batabano.*—Very few cases occur.
18. *Cabanos.*—Cases occur very rarely, and the disease is not endemic.
19. *Isle of Pines.*—Cases very seldom occur, and it is as remarkably free as is Bahia Honda from the disease.
20. *Mariel.*—Yellow fever is not endemic here.
21. *Puerto Padre.*—The disease is not endemic.

INLAND TOWNS.

22. *Bayamo.*—Occasionally epidemic, but not annually endemic.
23. *Bejucal.*—Suffers little with yellow fever.
24. *Ciego de Avila.*—Not endemic.
25. *Cobre.*—Yellow fever is not endemic.
26. *Colon.*—Yellow fever is not endemic.
27. *Guanabacoa.*—Cases occur annually.
28. *Guanajay.*—Cases occur in the majority of years.
29. *Guines.*—Yellow fever is not endemic.
30. *Holguin.*—Several epidemics since 1851, but cases do not occur every year.
31. *Jaruco.*—Endemic.
32. *Marianao.*—Endemic.
33. *Mayari.*—Not endemic.
34. *Palma Soriano.*—Not endemic.
35. *Pinar del Rio.*—Not endemic.
36. *Puerto Principe.*—Endemic.
37. *Remedios.*—Endemic.
38. *San Antonio.*—Endemic.
39. *Sancti Spiritus.*—Endemic.
40. *San Jose de las Lajas.*—Endemic.
41. *Santa Clara.*—Cases occur in the majority of years.
42. *Santiago.*—Endemic.
43. *Victoria de las Tunas.*—Cases occur in the majority of years.

The above 43 places are all those from which trustworthy information was secured, and it appears that of 21 seaports yellow fever occurs annually in 10 of them and does not occur annually in the remaining 11, while of 22 inland towns the disease occurs every year in 9 of them and not every year in the remaining 13. A larger proportion of the seaports exceed the inland towns in the extent of their commerce with permanently infected centers and in the number of immigrants, so that the above list tends very strongly to prove that seaports in Cuba are no more liable to yellow fever solely because located on the sea than are inland towns. Yet the contrary has long been taught.

The Isle of Pines, Bahia Honda, Cabanas, Mariel, Zaza, and other preeminently maritime places in Cuba suffer little, if at all, with yellow fever.

1648. "In this year there occurred in Havana, and in the fleet of Don Juan Pujados, a great 'pest of putrid fevers,' which remained in the port almost all summer. A third part of the garrison and a larger part of the crews and passengers in the vessels died." (Pezuela, vol. 3, p. 23.)

1649. "In the spring of 1649 an unknown and horrible epidemic, imported from the continent of America, caused consternation in Cuba. The unpublished history of the island says: 'A third part of its population was devoured, from May to October, by a species of putrid fever, which carried off those attacked in three days. In the capital (Havana), where the governor, Villalva, came near dying, there died, at short intervals, the counsellor of the governor, Francisco de Molina, and the lawyers Pedro Pedroso, Fernando de Tobar, and Pablo de Olivares, who successively replaced each other.' By this can be judged the ravages which the contagion must have inflicted on other classes and towns. In that of Santiago (de Cuba) it increased during the following summer so that the people fled for safety to the country." (Pezuela, vol. 3, p. 182.)

1653–54. "The epidemic was renewed with equal fury during this time, in spite of precautions taken to prevent communication between the towns, which were, however, better protected by their distance from each other and by the bad roads than by these precautions." (Ib., vol. 3, p. 182.)

1654–55. "This was an epoch of rivalry and disasters. In the capital the pest continued to carry away its victims without regard to rivalries and passions." (Ib., vol. 3, p. 185.)

When it is considered that in the early history of yellow fever it was most frequently designated "the pest," that the above scanty records indicate some of the characteristics of the disease while omitting any contraindications, and that historical records prove the existence of the disease during some of the years 1648–1654, in Barbados, Guadeloupe, Martinique, St. Christophe, and probably in Santo Domingo—"the cradle of yellow fever"—it is difficult to disbelieve that yellow fever did visit Cuba as an epidemic during the above recorded years. This probability renders still more remarkable the fact that after 1654 no other historical indications of yellow fever visitations to Havana are to be found until 1761, more than one hundred years. "On the contrary, there are repeated records of the great salubrity of the climate and the absence of epidemic diseases."

1761. "Although Havana is situated on the northern boundary of the torrid zone, it was very justly considered one of the most healthy localities on the island before its invasion in a permanent manner by the vomito negro (yellow fever), imported from Vera Cruz in the summer of 1761." (Pezuela, vol. 3, p. 19.)

"In May there came from Vera Cruz, with materials and some prisoners destined for the works on the exterior fortifications of Havana, the men-of-war *Reina* and *America*, which communicated to the neighborhood the epidemic known by the name of the 'vomito negro.' At the end of the following June there were stationed in this port nine men-of-war dispatched from Cadiz, and sent to the chief of the squadron, Don Gutierre de Hevia; they brought a reenforcement of 2,000 men. To the epidemic more than 3,000 persons succumbed on this the first appearance of the vomito. From May to October occurred the greater number of victims in the garrison and in the squadron." (Pezuela, vol. 3, p. 27.)

1765. "On June 30, the Conde de Riola was relieved by Field Marshal Don Diego Manrique, who died with vomito July 13." (Pezuela, vol. 3, p. 51.)

1779. In July and August there arrived from Spain, because of its war with Great Britain, "an army of 3,500 men, who were immediately decimated by the vomito." (Ib., vol. 3, p. 52.)

1780. On the 3d to 5th of August a large squadron brought an army of 8,000 men. "In the two following months they suffered a loss of about 2,000 men with the vomito." (Ib., vol. 3, p. 52.) And Surgeon Romay reports: "The same epidemic was renewed in 1780, there being in this city an armament and numerous garrisons on account of the war with Great Britain."

1794. "On the 9th of June the squadron of Aristizabal returned to repair damages at this port, where had arrived from Cadiz as reenforcements four ships with the chief of the squadron, Don Jose Ulloa. The vomito appeared so severely this summer that solely of the garrison and of the squadron more than 1,600 victims were taken, one of these being Ulloa. It was indispensable to resort to a general levy to replace the losses on the vessels." (Pezuela, vol. 3, p. 53.)

The statistics published in this report to the United States National Board of Health date back to 1851, and conclusively prove the annual prevalence of yellow fever from that date to the present time, not only in Havana, but also in numerous other places in Cuba.

So far as Havana is concerned, the statistics published herewith, together with the official manuscript reports of the military hospitals in Havana, and of the Cuban superior board of health, prove much more than the annual prevalence of yellow fever; for they prove that during the 408 months, from January, 1856, to January, 1880, there was but one single month, viz, December, 1866, exempt from an officially reported case of the disease. Now, the combined reports referred to begin only with 1856, and they refer from 1856 to 1869 solely to the military and civil hospitals, exclusive of the very numerous cases of yellow fever in the preponderating civil population not treated in the hospitals; hence, the facts stated justify the conclusion that yellow fever has prevailed in Havana monthly, not only for the past twenty-four years, but also, in all probability, for many years anterior to 1856.

Annual deaths from yellow fever in Havana, 1870–1879.

Year.	Military and civil population.	Civil population.
1870	665	277
1871	991	796
1872	515	372
1873	1,244	1,019
1874	1,425	1,236
1875	1,001	94
1876	1,619	904
1877	1,374	567
1878	1,559	758
1879	1,444	737
Total	11,837	6,760

Cases and deaths of yellow fever in the Spanish navy.

Year.	Cases.	Deaths.	Year.	Cases.	Deaths.
1870	1,094	231	1876	324	75
1871	105	41	1877	429	156
1872	192	37	1878	526	163
1873	133	33	First six months, 1879	305	90
1874	325	129			
1875	631	203	Total	4,064	1,158

ISLE OF PINES.

This island appertains to the province of Havana. It is about 90 miles from the city and 54 from Batabano, whence a steamer runs once or twice a week. It contains about 540 square miles, a mountain range with a peak 1,650 feet high, and "the most wonderful mineral springs in the world," as is alleged. It has two villages on the north coast, which contained in 1862 a population of 1,293, out of a total population on the island of 2,062. The population of the island in 1877 is reported to have been 1,693.

Pequela reported in 1854 that "cases of yellow fever, of smallpox, and of cholera have not been seen at the Isle of Pines."

The military hospital statistics, Table No. 46, embrace the twenty-eight years, 1851–1878, and show a remarkable freedom from yellow fever. There were no cases until 1855, and then only two cases. Only in 1856, 1859, and 1864 were the cases at all numerous; and during the recent thirteen years, 1866–1878, there had not been one case. The records of the military hospitals at Cuba show no exemption comparable to this at any other place except at Bahia Honda.

Yellow fever cases and deaths in the civil population of Matanzas from July, 1857, to August, 1879, as recorded by the board of health.

Year.	Cases.	Deaths.	Remarks.
1857 (six months of)	426	168	Only for July to December, 1857.
1858	846	345	Of these 149 cases and 53 deaths in January.
1859	84	22	
1860	192	49	
1861	213	50	
1862	262	56	Of these 77 cases and 18 deaths in January, February, and March.
1863 (nine months of)	9	1	No records for June, September, October.
1864	768	188	
1865	281	91	
1866 (no months of recorded)	(1)	(1)	No cases in military hospital.
1867	208	36	
1868	28	7	
1869 (four months of)	23	10	For March, April, May, June, only.
1870 (eight months of)	13	7	No records for January, February, March, and September.
1871	55	8	
1872	20	1	
1873	329	62	
1874	220	47	
1875	124	8	
1876	124	6	In addition, 212 cases of soldiers.
1877	136	21	
1878	301	97	In addition, 299 cases of soldiers.
1879 (first seven months of)	53	27	

[1] Records.

Respectfully submitted.

GEO. M. STERNBERG,
Surgeon-General United States Army.

The SECRETARY OF WAR.

When war was declared and it became evident that an army of invasion would speedily embark for Cuba, I strengthened the medical force of the Fifth Army Corps, which was selected for this duty, by assigning to it medical men who had a practical knowledge of the management of yellow fever. Suggestions to commanding and medical officers for the prevention of yellow fever and the preservation of the health of the troops when in Cuba were drawn up by Acting Assistant Surgeon Guiteras, and published in general orders from the headquarters of the corps, June 2, 1898:

> The general hygienic rules for the government of military camps should be enforced. Your attention is called to the following special points:
>
> *The use of quinine.*—The regular administration of quinine for the prevention of malaria is of doubtful advantage. Quinine, however, should be used when the individual is subjected to extraordinary depressing influences, such as traumatism, exhaustion. Several substitutes for quinine have been used by the Cuban army, but with little effectiveness. The best is probably a decoction of coffee and lemon.
>
> *Alcohol.*—The excessive use of alcohol is specially deleterious in the Tropics. Diluted wines with the meals are generally used, and with advantage. Stronger liquors internally, and in the form of frictions, may be recommended after prolonged exposure to wet. The aguardiente produced in the country is used with advantage in slight diarrheal troubles. In the treatment of the latter stages of yellow fever effervescing alcoholic drinks are useful, but we can not prescribe the large doses employed in typhoid fever and pneumonia.
>
> *Fruits.*—We would especially recommend the cocoanut water when the nut is green (may be found throughout the year), the sugar cane (from November to April), the sugar apple (August and September), the orange (during the winter months), and the mango (June and July). The latter fruit should be especially avoided when green or overripe. The sapodilla (May and June), the mammey apple (August), the banana (all the year round), and the pineapple (November and December) are less easily digested and should be eaten sparingly. The alligator pear (July and August), should be eaten with the meals and not to excess. The tamarind and the ripe guava (the latter most abundant from June to November) are laxative.
>
> The vegetables of the country—the yam, the yucca, the malanga, and the sweet potato—should be thoroughly cooked. Rice and plantains properly cooked are favorite dishes with the natives. They are nourishing and easily digested. I recommend that the method of preparation should be learned from the natives.
>
> *Water.*—The spring waters in Cuba are usually good and abundant in many sections of the island. Yellow fever is not conveyed in the water, but typhoid fever and probably also malaria, dysentery, and some of the parasitic diseases are transmitted in the drinking water. Unless the water is obtained directly from the springs it should be boiled.
>
> *Bathing.*—Bathing every day in the running streams is safe, and to be recommended. The best hour for bathing is about 11 a. m.
>
> *Clothing.*—Light linen or cotton should be worn next to the skin. Wool irritates the skin, promotes excessive perspiration, and prevents the cooling effect of evaporation. The danger of chilling by the rapid cooling of the surface under wet linen can be prevented readily by a change of clothing, or by an outer dry garment, or the woolen blouse, when the body is exposed to drafts of air.
>
> The bed coverings should be comfortable. Wet clothing and wet feet should be especially avoided during sleeping hours.
>
> *The tent flooring.*—The hammock may be more comfortable than the floor, and it will certainly afford protection against troublesome insects, but there is no proof that the elevation of 2 or 3 feet from the ground will prevent the introduction into the body of miasms of disease. If it be not practicable to swing large bodies of troops, there will be found in Cuba an abundance of tall grass that may be used in lieu of straw.
>
> *Work.*—No exercise or exposure to the direct rays of the sun should be permitted between the hours of 11 a. m. and 3 p. m. The morning hours are the best for marching. The heavy showers and thunder storms occur usually in the afternoon after 2 o'clock. The mornings are usually clear. Continuous rain storms are cyclonic; and they occur mostly in September and October.
>
> *The site of the encampment.*—The ordinary rules should govern us in the selection of a camp site. The ground should be high. The prevailing winds are from the northeast, and the slopes of the hills fronting this quarter should be selected. The privies should be located to the northwest of the camp.
>
> With respect to yellow fever, two important facts should be borne in mind: (1) Yellow fever prevails habitually (so-called endemicity) only in a few and small sections of the island. (2) Yellow fever may be carried to, and when so carried may spread in all sections of the country. The sections referred to under No. 1 are the populous centers, especially the seaport towns of commercial importance,

such as Havana, Matanzas, Cardenas, Sagua, Santiago de Cuba, Manzanillo, Cienfuegos, Batabano. The large towns in the interior that have a free communication with the above are also frequently the seat of epidemics. In the country districts yellow fever is an imported disease.

The troops, then, should be kept, as far as is practicable, out of the cities, and every precaution must be taken to prevent the introduction of yellow fever into the camps.

The means of conveyance of the disease into the camp will be through supplies; through prisoners of war; through detachments of our troops that may have been forced to occupy infected districts; through the smuggling of things into the camp. Against all these dangers we must institute the rules governing a strict quarantine. Our supplies should come from the north, and if depots for such supplies must be established on the island, we should select noninfected places for this purpose. Prisoners of war should be corralled in a place of detention, guarded, if possible, by immune troops. The clothing of the prisoners should be disinfected at once. If no other measures of disinfection are available, we can place much reliance upon fresh air and sunlight, provided the exposure of every piece be complete. The period of detention and observation of these prisoners should extend over seven days.

The presence of a case of yellow fever in a camp is no evidence that the camp is, or that it will become, infected. Yellow fever is not directly transmissible. If the house, the room, the tent where a case of yellow fever is found be not infected, individuals may come in contact with such a case or cases without contracting the disease. Large yellow-fever hospitals have been managed without a single case occurring among the attendants, though these were not immune.

In the detention camps established by the Marine-Hospital Service near large epidemic centers the disease has never spread among the refugees. Of course, a certain proportion of these refugees are stricken down with the disease. They have contracted it in the epidemic center, and when they arrive in camp they are going through the process of incubation. The disease, therefore, breaks out within the first five days after arrival. The permanent residents of the camp—the attendants and the refugees who have been detained in camp longer than seven days—never contract the disease from these imported cases. This means that the camp has not become infected.

The measures taken to prevent the infection of these camps are twofold: (1) The baggage of these people is disinfected immediately upon the arrival in camp. (2) A careful watch is kept upon these new arrivals and upon everybody in the encampment. On the first appearance of suspicious symptoms the individual affected is removed to a hospital especially provided for this purpose. The safety then depends upon the prompt recognition of the symptoms and the immediate isolation of the cases.

Our military camps should be divided from the start into two distinct and separate parts—one a main camp, the other a hospital camp. The latter should be situated from one-fourth to one-half a mile to leeward of the main camp.

A few tents should be placed about 100 yards from the hospital camp for the care of suspicious cases in which the diagnosis may be uncertain. This should be called the probation camp.

The hospital camp should be surrounded by a barbed-wire fence, and should be carefully guarded.

Even the hospital camp does not necessarily become infected. Disinfection of the clothing and the dejecta should be instituted to prevent this. The probation hospital should be carefully guarded against infection. When a case has been recognized as one of yellow fever and has been removed to the hospital camp, the walls of the tent should be washed down with a solution of bichloride of mercury 1 to 2,000, and the ground should be burned by a Barber asphalt furnace. Patient may be returned to the main camp ten days after the establishment of a convalescence and after disinfection of the clothing.

If there be evidence that cases of yellow fever have originated in the main camp it should be moved.

The diagnosis of yellow fever is based upon the following three cardinal symptoms: The characteristic appearance of the face, which may show itself with sufficient distinctness in the first twenty-four hours, and the albumin in the urine, and the peculiar discrepancy between the pulse and temperature. The two latter symptoms may not appear until the third or fourth day of the disease.

General Shafter's corps disembarked near Siboney and the Jurag Iron Works. It is now known that Siboney was infected. The sick reports of the iron company show that cases of yellow fever occurred among their employees every year from 1890 until the works were closed in 1897. In 1891 265 cases, 100 fatal, were recorded in an average population of about 1,300. From June to November, 1895, there were 107 cases, 47 fatal; and sporadic cases were present at intervals during the whole period. But Lieutenant-Colonel Pope, chief surgeon of the corps, was not aware of this at that time. Indeed, shortly after the debarkation he called upon the commander of the Cuban forces, who, with his staff, occupied one of the most desirable looking houses in the village, and inquired concerning the possibility of danger to the army from infected houses. He was told that there had been no case of yellow fever there recently, and that to burn the village on the assumption that some of the houses were infected would seem to be a wanton destruction of property. Early in the second week of July, however, yellow fever was discovered by Dr. Guiteras in men who were occupying some of these houses, and the disease thereafter spread rapidly until the troops were shipped from the infected locality.

Later in the year preparations were made to send an army of occupation to the island. These troops were to embark for Cuba toward the end of December, the season of least danger from yellow fever. The infection of the disease is present in certain parts of the island at all seasons. In Havana cases and deaths have been recorded in every month of the year. Lieut. Col. R. M. O'Reilly, United States Volunteers, chief surgeon on the staff of Major-General Wade, president of the commission on the evacuation of the island of Cuba, obtained much valuable information concerning the prevalence of disease among the Spanish troops. The Spanish medical authorities courteously afforded him every facility in his endeavor to procure information which would be of interest to the Medical Department of our Army. The following table thus obtained shows the disastrous effects produced by yellow fever in the ranks of the Spanish army during the two years and eleven months from February 1, 1895, to December 31, 1897.

Yellow fever, cases and deaths in the military hospitals, Cuba, from February, 1895, to December, 1897, inclusive.

Months.	1895.		1896.		1897.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January			479	175	927	276
February	69	10	401	120	324	83
March	189	14	298	74	318	106
April	218	27	343	86	508	130
May	241	39	1,074	138	814	228
June	577	145	1,053	485	1,745	388
July	1,062	454	3,114	817	2,530	825
August	825	428	3,206	1,027	2,203	869
September	883	430	2,074	744	2,020	641
October	797	537	3,393	1,063	1,516	367
November	696	455	3,897	1,214	772	209
December	523	348	2,436	667	855	189
Aggregate	6,080	2,887	21,768	6,610	14,532	4,311

The total number of cases treated in the military hospitals of the island during this period was 42,380, of which 13,808, or nearly one-third (32.6 per cent), terminated fatally. The report does not give the mean strength of the army in which these losses occurred, but this is of little moment in the present connection, for these figures tell their own story irrespective of how many troops there were on the island who had passed through this terrible ordeal to constitute a part of the mean strength of this period. The question would rather be, How many new troops arrived from Spain during these years? The large number of cases in 1896 and 1897, as compared with 1895, indicates the heavy reinforcements sent over from Spain on account of the progress of the insurrection.

These statistics imply that although season has an influence in augmenting or lessening the prevalence of the disease, the main factor in the case of the Spanish army was the number of men sent from Spain to the island to swell the number of victims. They also suggest what would be the fate of United States troops whether sent in December or any other month in the absence of a vigorous sanitary code for their protection.

While the evacuation of the island by the Spaniards was in progress medical inspections were made by our officers to determine the condition of the various towns near which it was proposed to quarter our troops. See page 165 for a report illustrating the character of the work of this kind done by our medical officers. One officer inspected and reported on the condition of the various hospitals in the city of Havana (see infra, page 155).

At this time I sent Lieutenant-Colonel O'Reilly to the island of Jamaica to study and report upon the methods adopted by the British military authorities which had reduced the death rates in the garrisons there from more than decimating proportions annually to little more than was to be expected among European troops under exposure to tropical climatic conditions. His report emphasized the necessity for carrying into effect the sanitary orders which had already been promulgated. It shows a frightful death rate among the troops constituting the early garrisons and a reduction in the death rate in progress of years as the insanitary conditions affecting the men were recognized and removed. The number of white soldiers was reduced, their place being taken by native troops under white officers. The coast cities and other sea-level stations known to be unhealthy were abandoned or their sanitation was so improved that they were considered fairly safe, except under conditions of epidemic visitation. Drainage was improved. Liberal air space and free ventilation were provided. The dormitories were raised above the ground level and the surface of the ground beneath the barracks was cemented to exclude harmful exhalations. The dry-earth system of disposal of excreta was introduced and contamination of the camp site was prevented by careful police, the use of urinals, and the removal of garbage and other refuse to a distance of 6 miles. This scavenger work was performed by civilian laborers under contract. Food and clothing were made suitable to the climate and canteens were established in certain of the regiments to keep the men from alcoholic excesses and their consequences. The following extracts from this report are submitted:

[Instructions.]

Lieut. Col. R. M. O'Reilly,
Chief Surgeon, U. S. Volunteers, Washington, D. C.

Sir: In compliance with instructions contained in letter from the Adjutant-General of the Army, dated December 2, 1898, you are expected to make a careful inquiry with reference to the methods now in use in the island of Jamaica for protecting soldiers of the British army stationed upon that island from fatal infectious diseases and from the deleterious effects of climatic influences. You should ascertain, as far as practicable, the results attained by improved methods which have been adopted as the result of experience, and full details as regards the housing, clothing, and feeding of British soldiers in semitropical climates; also the methods found most satisfactory for the disposal of excreta and for the protection of troops from infectious diseases, and especially yellow fever, dysentery, camp diarrhea, and the malarial fevers. The measures of prophylaxis adopted and the results of such measures should be fully investigated.

Especial attention should be given to the question of rations and clothing which have been found suitable for the climate of Jamaica; also as to the construction of barracks found by experience to be most suitable and conducive to the health of soldiers in garrison; also to everything pertaining to camp equipment and the sanitation of camps as practiced and as required by Army Regulations and Orders.

You are expected to make to the Adjutant-General of the Army a full report upon these subjects.

Very respectfully,

GEO. M. STERNBERG,
Surgeon-General United States Army.

* * * * * * *

The governor received us very courteously and at once placed us in communication with the commander of the forces in the island of Jamaica, Major-General Hallowes, who introduced us to his staff, the officers of the garrison at Up Park Camp, and the officers of the various supply departments, medical and otherwise. We were also presented to the commandant of the naval station at Port Royal, Commodore Henderson, R. N. All these officers were most willing to furnish us any information and to do everything in their power to facilitate the object of our visit. Practically, a certain amount of delay was caused by our arrival during the holiday season, and by the fact that office hours in Jamaica are from 10 a. m. to 1 p. m., and beyond these hours it was not considered proper to trespass on the time of the officers from whom we were securing information.

* * * * * * *

Although the climate of Jamaica varies greatly with altitude and topographic situation, it is in general pleasant, healthful, and salubrious, the cold northern winds which affect Cuba being hardly felt, and the temperature, therefore, being much more uniform throughout the year. The low seacoasts are the warmest portions, the larger part of the habitable island, at altitudes of from 1,000 to 3,000 feet, being decidedly cooler. The southern coast, at the foot of the Blue Mountain range, is warm and arid, much like the Santiago coast of Cuba. As one ascends the slopes the precipitation increases and the temperature falls rapidly, until in the higher portions the climate is wet and cool. The mean temperature at the coast is 78.2° F.; at 2,000 feet, 73° F.; at 5,000 feet, 62.6° F.; at 5,500 feet, 60° F.; at 7,400 feet, 55.7° F.

At Kingston, one of the hottest and driest places on the island, the highest temperature during ten years was 89.7° F. and the minimum 67.8° F., the maxima for the period averaging 87.8° F. and the minima 70.7° F., showing a range of only 17° F.

The climate of the plateau region is especially pleasant, the temperature in St. Elizabeth, for instance, having an annual variation of only 9° F., fluctuating between a minimum of 67° F. and a maximum of 75° F.

The rainfall at Kingston is only 44 inches, while on the north side of the island it is 88, even reaching 100 inches.

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Before entering upon the discussion of the conditions found to exist in the island of Jamaica at present, it will be instructive to take a glance into its past and see how well it has earned for itself the title of the "Graveyard of the English."

The Seventy-ninth Regiment arrived in July, 1779, 1,008 strong, and were quartered at Kingston. During four years they lost 910 men and 200 were discharged or invalided.

The Sixtieth Regiment landed 387 strong in February, 1780. Two-fifths (155) died during the year. A detachment of 200 men were sent upon an expedition to Fort San Juan, of whom few or none ever returned.

The Eighty-eighth Regiment arrived in March, 1780. During two years they lost 550 out of 791 men. They were stationed at Rock Fort and Castile Fort.

The Eighty-fifth, Ninety-second, Ninety-third, and Ninety-fourth regiments arrived in July and August, 1780, and lost heavily, owing to having neither barrack nor hospital accommodations. The sick varied from two-ninths to one-half of the entire force. The Ninety-third lost one-half of their number during the first six months, and of the remainder only 73 were then fit for duty. Only one-seventh of the Ninety-fourth Regiment remained fit for duty at the end of two years and four months. Of the four regiments, more than two-fifths of the number landed died during the first six months.

During the three and one-half years (1779 to 1782) the average number of sick equaled one-third of the entire force, and 3,500 men died in less than four years terminating December, 1782.

* * * * * * *

Still later, from 1803 to 1816, the average annual mortality per 1,000 was 127. Vital statistics had not been framed in those early days, and it is impossible to tell what the cause of this heavy mortality was; we can only hazard a guess.

It was not until 1817 that any practical attempt was made at a systematic compilation of disease statistics as far as the West Indies is concerned. During the period 1817 to 1836 the average strength, admissions, deaths, and ratio per 1,000 per annum were as follows:

	Average strength.	Average admissions.	Average deaths.	Ratio per 1,000.	
				Admissions.	Deaths.
Europeans	2,578	4,672	313	1,812.26	121.3
Natives	286	92	9	321.68	31.47

* * * * * * *

During the healthiest year the mortality amongst Europeans was four to five times greater than in England, and in the unhealthy years was sixteen times as great.

* * * * * * *

"As to the cause or causes of the heavy sickness described in the foregoing remarks," says Maunsell, "elevated temperature, not being acclimatized, rainfall and temperature combined, absence of trade winds at certain seasons, geological formations, the vicinity of marshes and swamps were all laid under contribution. It was not for many years after the period under review that the true causes became apparent, none of which had been much thought of in those days when sanitation was unknown.

"First. Overcrowding. It is stated that at Tabago, in the barracks, which were the best in the whole command, the men had only 250 cubic feet per man of air space; that each man had a space of only 22 to 23 inches in breadth, and that they slept in hammocks packed as closely as possible.

"Second. They wore European clothing, thick and tight fitting, unsuitable to the climate.

"Third. The night soil, instead of being removed, was collected in large cesspits about the barracks. These were seldom emptied. Neglect of surface conservancy.

"Fourth. No doubt the bad water was also a factor in producing disease.

"Fifth. Defective ventilation.

"Sixth. General want of attention to personal hygiene."

Yet as early as 1788 Dr. Hunter, in his work on Army Diseases, had made the following very sound observations:

"It is further to be remarked that those who are just arrived from cool and healthy climates are particularly subject to fevers, as is daily experienced by all newcomers. A regiment always loses a greater proportion of men the first year than afterwards, supposing their fitness to be the same.

"The troops to be sent should consist of well-disciplined, and not new-raised men; for the latter, being less orderly, and not accustomed to the life of a soldier, suffer greatly more from the climate than men habituated to discipline, as was observable in all the young regiments sent to that part of the world. Besides, it is almost impracticable to discipline men in a country in which they have so many difficulties to encounter, and where the great heat renders it impossible to exercise them in the open air except for a short time in the morning or evening."

* * * * * * *

The following statistics show the gradual improvement which has gone on, step by step, through giving the European troops sufficient barrack-room accommodations, by attention to general sanitary requirements indispensable to health in this climate, and by perseverance in the principle of locating them permanently in the hills:

1817 TO 1836.

[Average strength, 2,578.]

Cause.	Total admissions.	Average annual admissions.	Total deaths.	Average annual deaths.	Ratio per 1,000.	
					Admissions.	Deaths.
From all diseases	93,455	4,673	6,254	313	1,812.55	121.3
From fevers	46,922	2,346	5,253	262	910.08	101.9

1838 TO 1847.

[Average strength, 1,538.]

From all diseases [1]	14,086	2,348	973	97	1,526.66	63.07
From fevers [2]	6,562	820	615	61	334.16	39.66

[1] No record of admissions from 1842–1845.

[2] No record of admissions for 1842 and 1845.

1848 TO 1859.

[Average strength, 734.]

From all diseases [1]	10,058	838	267	24	1,141.69	32.70
From fevers [1]	1,084	153	141	14	208.45	19.08

[1] No record of admissions and deaths for 1851, and no record of deaths for 1858.

1860 TO 1869.

[Average strength, 706.]

From all diseases	6,670	667	151	13	994.76	21.25
From fevers	----------	----------	----------	8	----------	11.34

1870 TO 1879.

[Average strength, 354.]

From all diseases	----------	----------	----------	5	----------	13.77

1880 TO 1889.

[Average strength, 390.]

From all diseases	----------	----------	----------	4	----------	11.36
From fevers	----------	----------	----------	1	----------	4.30

The measures which led to the improvement of the previously existing conditions may be briefly stated under the following heads:

1. Where practicable, troops are now landed in November, and owing to the introduction of steam navigation and the careful manner in which provision is made for the comfortable, safe, and healthful transportation of the troops, they are landed in the island in good condition. There is now no trouble with scurvy among transported troops, as was the case in former years when transportation was slower and the men were practically dependent upon salted meats while on shipboard.

2. The white troops, with the exception of the small garrison at Port Royal, are at once sent to Newcastle, at an elevation of 4,000 feet above the sea level, where all proper sanitary precautions are taken.

3. The stations which were known to be unhealthy have been abandoned, or their sanitation has been improved to such an extent that they are considered fairly safe except under unusual circumstances. The only two posts on the lowlands now occupied are Port Royal and Up Park Camp.

4. The introduction of the canteen, from which the men can now always procure beer, which they drink in preference to spirits. The testimony of the officers is that the canteen is largely instrumental in the disuse of spirituous liquors.

5. Furthermore, the men are properly clad with clothing that is loose, comfortable, and adapted to the climate. The European troops wear khaki clothing, with flannel next to the skin. All troops wear cork helmets, which afford the best protection against the tropical sun. The non-Europeans wear a species of Zouave uniform, the trousers of which are unusually high in the waist, and so afford protection to the abdomen.

6. The sanitation of Kingston and the island generally, details of which are given in a paper hereto appended and marked Exhibit D, contributed by Deputy Surg. Gen. Hon. C. B. Mosse, C. B., superintending medical officer of the island.

The removal of underbrush, the construction of proper surface drains, abundant supply of wholesome water, the introduction of the earth-closet system, the prompt removal and destruction of garbage in all the garrisons, liberal ventilation, raising dormitories above the ground level and cementing the ground under habitations, providing amusements within the posts for the men, using as far as possible native, acclimated troops; doing all scavenging, etc., by contract.

Up Park Camp, the principal station on the island, is situated about 3 miles from Kingston, at an elevation of about 200 feet above the sea level. The barracks are in three parallel ranges. Some of the buildings have the lower floors resting immediately upon the ground, while others are raised on high arches. The result has been that fever generally originated in the basement floors, and the most fatal cases have been taken from these rooms, especially after heavy rains.

Two of the blocks of barrack buildings are raised above the ground on pillars, and it is said that this was done for purposes of architectural design and not for any principle of sanitation. At first the spaces under the raised buildings were used for storage purposes, not only preventing the necessary circulation of air, but in themselves generating unwholesome effluvia. From the lower rooms of the blocks which were not raised above the ground the most serious forms of fever were admitted to the sick list.

The principle had not then been mastered which is now recognized, viz, that for health it is a sine qua non in this climate that dwelling rooms should be raise above the ground, so as to admit the free passage of fresh air, and that the groun should be hermetically sealed by concrete against the passage upward of unwholesome ground effluvia.

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All garbage is removed by contract. It is carried to a distance of 6 miles an burned.

The excreta are provided for by the dry-earth system. Each barrack has on privy, which is furnished with a number of galvanized-iron buckets and with dr earth and scoops, so that immediately after defecation a man can cover his excrement with this earth. Last year lime was used with the dry earth to advantage Dry-earth sheds are used, to have always a supply of dry earth during the rain season.

A separate place is provided for urination. The receptacle is a wooden tub which is tarred.

These tubs, as well as the buckets in the dry-earth closets, are emptied once i every twenty-four hours by a contractor, who carries the deposited matters to point 6 miles to leeward of the camp and there buries them.

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The officers as well as the men of the European troops in the West Indies wea the khaki uniform. The opinion of the majority of the officers is that khaki i the proper kind of clothing on account of its cheapness, because it can be easily an cheaply washed, and that by wearing flannels with the material the health is preserved in any climate. Woolen shirts are always worn with the khaki as well a with the blue woolen serge uniforms. The British officers who have seen servic in India, Africa, and the West Indies claim that khaki is the best service uniform but they also say that every man is required to wear the woolen shirts next to th skin. Undershirts and drawers are not issued. Practically no attention is give to the cholera band, except during the sickly season, and even then the matter i in charge of the noncommissioned officers.

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CONCLUSIONS AND RECOMMENDATIONS.

1. The troops for service in Cuba should, as far as possible, be recruited in th Southern States, and a large proportion of these troops should be colored, wit white officers. They should be thoroughly protected against smallpox befor embarking for the island.

2. They should be sent there very shortly after the close of the rainy season, say at some time in November.

3. They should be quartered in barracks the dormitories of which are raised above the ground, the ground underneath cemented, and the most liberal ventilation afforded. All underbrush within practicable distance should be removed. The earth-closet system should be used in preference to cesspools, and the excreta removed by contract. The kitchen should be detached and protected against flies. Mosquito bars should be furnished.

Abundant water supply should be provided, and all drinking water should be filtered or boiled.

Each man should be allowed a minimum of 75 feet superficial and 600 cubic feet of air space.

Bathing facilities should be provided and their use made compulsory. Drainage should be carefully provided for.

Amusements, games, and athletic sports should be provided for the men.

4. Clothing. Although there are objections to the khaki, the testimony is generally favorable to its use, and it is therefore recommended, but the blue flannel shirts and light flannel drawers should always be worn. Light cork helmets, made so as to shade the back of the neck, should be issued. Waterproof overcoats should be provided in limited numbers for use of the necessary guard and orderlies during the rainy season.

The other articles of our clothing fulfill the requirements.

5. No improvement on the present ration can be suggested. If it errs at all, it errs on the side of too great liberality.

So far as possible the troops should be saved from all exposure at night and in the early morning, and no one should be called on for any duty at night or early in the morning, without being given at least a cup of coffee.

6. Rigid discipline should be enforced; communication with the towns should be reduced to a minimum, and every means used to impress upon officers and men the fact that indulgence in spirituous liquors and excesses of any kind are exceptionally dangerous.

7. The sanitary measures to be taken in case of the outbreak of epidemic have already been provided for by the Surgeon-General of the Army, and it is useless to recapitulate.

After a full consideration of the dangers to which our troops were to be exposed in their occupation of the island, and of the sanitary rules which experience had shown to be best qualified to avert them, I addressed the following communication to the Adjutant-General of the Army:

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, December 29, 1898.

SIR: In view of the occupation of the island of Cuba by United States soldiers a majority of whom will be subjected to climatic conditions to which they are unaccustomed and to local insanitary conditions which past experience shows are very inimical to the health of unacclimated troops, I have the honor to make the following recommendations:

First. The number of unacclimated troops should be no greater than is imperatively called for by the military occupation of the island, and so far as practicable colored troops or native Cubans should be enlisted for this service.

Second. Unacclimated troops should not be stationed in any of the yellow fever infected cities of the island, and after the 1st of April they should not be permitted to visit these cities unless an urgent military reason makes their presence necessary. Camps should be located so far away from these infected cities that unauthorized intercourse will be difficult, and stringent orders should be made and enforced to prevent such intercourse.

Every camp should have a quarantine camp and hospital for the detention, under observation, of all persons who have been exposed, either with or without authority, in a yellow fever infected locality. All suspicious cases of fever should at once be removed to the hospital at the quarantine camp.

Third. The most stringent regulations should be enforced to preserve the health of the troops. As a basis for such sanitary regulations I respectfully call attention to the following extract from my Circular No. 1, dated April 25, 1898:

"In Cuba our armies will have to contend not only with malarial fevers and the usual camp diseases—typhoid fever, diarrhea, and dysentery—but they will be more or less exposed in localities where yellow fever is epidemic and under conditions extremely favorable for the development of an epidemic among unacclimated troops. In view of this danger the attention of medical officers and of all others responsible for the health of our troops in the field is invited to the following recommendations:

"When practicable, camps should be established on high and well-drained ground, not previously occupied.

"Sinks should be dug before a camp is occupied, or as soon after as practicable. The surface of fecal matter should be covered with fresh earth or quicklime or ashes three times a day.

"New sinks should be dug and old ones filled when contents of old ones are 2 feet from surface of ground.

"Every man should be punished who fails to make use of the sinks.

"All kitchen refuse should be promptly buried and perfect sanitary police maintained.

"Troops should drink only boiled or filtered water and coffee or tea (hot or cold), except where spring water can be obtained which is pronounced to be wholesome by a medical officer.

"Every case of fever should receive prompt attention. If albumin is found in the urine of a patient with fever it should be considered suspicious (of yellow fever) and he should be placed in an isolated tent. The discharges of patients with fever should always be disinfected at once with solution of carbolic acid (5 per cent) or of chloride of lime (6 ounces to a gallon of water) or with milk of lime made from fresh quicklime.

"Whenever a case of yellow fever occurs in camp the troops should be promptly moved to a fresh camping ground located a mile or more from the infected camp.

"No doubt typhoid fever, camp diarrhea, and probably yellow fever are frequently communicated to soldiers in camp through the agency of flies, which swarm about fecal matter and filth of all kinds deposited upon the ground or in shallow pits and directly convey infectious material, attached to their feet or contained in their excreta, to the food which is exposed while being prepared at the company kitchens or while being served in the mess tent. It is for this reason that a strict sanitary police is so important, also because the water supply may be contaminated in the same way or by surface drainage.

"If it can be avoided, marches should not be made in the hottest part of the day—from 10 a. m. to 5 p. m.

"When called upon for duty at night or early in the morning a cup of hot coffee should be taken.

"It is unsafe to eat heartily or drink freely when greatly fatigued or overheated.

"Ripe fruit may be eaten in moderation, but green or overripe fruit will give rise to bowel complaints. Food should be thoroughly cooked and free from fermentation or putrefactive changes.

"In decidedly malarious localities from 3 to 5 grains of quinine may be taken in the early morning as a prophylactic, but the taking of quinine as a routine practice should only be recommended under exceptional circumstances.

"Light woolen underclothing should be worn, and when a soldier's clothing or bedding becomes damp from exposure to rain or heavy dews the first opportunity should be taken to dry it in the sun or by fires."

Fourth. When cases of yellow fever occur in a camp or barracks under such circumstances as to indicate that the locality is infected the troops should at once be removed. The disastrous mistake has frequently been made of removing the sick and leaving the well in an infected locality. To repeat this mistake in the light of our present knowledge would be unpardonable.

The most dangerous towns upon the island of Cuba, so far as yellow fever is concerned, were pointed out by me in a letter to the honorable the Secretary of War dated March 25, 1898. This list includes all the principal seaport cities—Havana, Matanzas, Cardenas, Cienfuegos, Sagua, Manzanillo, Nuevitas, Santiago, and Guantanamo. The disease is also endemic at Puerto Principe, Remedios, Jaruco, San Antonio and certain other inland towns.

Very respectfully,

GEO. M. STERNBERG,
Surgeon-General United States Army.

The ADJUTANT-GENERAL OF THE ARMY.

The volunteer troops of the Seventh Army Corps occupied the island until April, 1899, when they were replaced by regular troops. Care was taken that each regimental or detachment camp should have a well-equipped hospital and that a reserve or departmental hospital should be established for the relief of the local institutions in case of an unusual prevalence of disease, the general hospitals and hospital ships being also available for this purpose The chief surgeon of the Division of Cuba in his annual report states that—

> Posts have been lavishly supplied with medicines, instruments, etc., necessary for the care of the sick. The medical-supply depot from its establishment has been amply furnished with medicines and stores. Heavy demands for disinfectants have been made upon it, but they have always been promptly honored. Lime in large quantities has been here purchased for the various garrisons, corrals, etc., in the vicinity. Various subsidiary supply depots at different places have been discontinued as being no longer needed. All requisitions made on the Surgeon-General have been promptly filled. I may state as an instance that in anticipation of an unusual demand for disinfectants I telegraphed to the Surgeon-General and in less than three hours received a reply stating that the article had been ordered shipped.

Maj. Frank J. Ives, surgeon, United States Volunteers, in a report to the adjutant-general of the Department of Matanzas and Santa Clara, July 31, 1899, makes mention of the preparation to meet the medical emergencies of garrison life in Cuba in the following terms:

> Prior to leaving the United States the Medical Department had made such ample provisions for the care of the sick in Cuba that never before in that respect was an army more completely equipped. So much had been written and said of a sensational character regarding the large size of the anticipated sick list that we were fully prepared to treat in hospital at least 15 per cent of the command, and with the two large general hospitals in Havana, the hospital ships, and the various general hospitals in the United States, we were not in the least apprehensive that the sick would fail to receive the proper attention.

The volunteers were mostly sheltered under canvas during their service in Cuba. The desirability of having the troops quartered in barracks as a preventive of the malarial fevers and diarrheal diseases which are prevalent during the rainy season led me to submit the following communication to the Adjutant-General of the Army:

War Department, Surgeon-General's Office,
Washington, January 17, 1899.

Sir: After the 1st of May, and possibly before that date, we have every reason to expect a considerable increase in the amount of sickness among our troops stationed in Cuba. The so-called "rainy season" is from May to September, and it is the general opinion of physicians who have practiced in the island that troops should be sheltered in barracks of some kind during this season, and that a large amount of preventable sickness may be expected if the troops are obliged to pass through the unhealthy season in tents.

In the interior, malarial diseases, diarrhea, and dysentery prevail in many of the localities to which troops have been ordered. Yellow fever also prevails occasionly at some of the interior cities and it is endemic at most of the principal seaport cities of the island; the season of prevalence being from May to December.

In my opinion it is very important from a sanitary point of view that troops remaining in Cuba during the unhealthy season should be quartered in barracks rather than in tents. In certain places the barrack formerly occupied by the Spanish troops, after being thoroughly disinfected and repaired, will answer the purpose admirably; in other places it will probably be necessary to build temporary frame barracks; in certain localities it may be practicable to use private houses or public buildings; suburban villas and country houses are sometimes of such dimensions that they may be used as barracks for one or more companies.

I respectfully urge that prompt orders may be given with reference to the shelter of the troops to remain in Cuba in order that this may be accomplished before the first of May.

Very respectfully,

Geo. M. Sternberg,
Surgeon-General United States Army.

The Adjutant-General of the Army.

The work necessary for the proper housing of the troops was carried on with energy, although delayed in many instances by the failure of imported materials to be on hand when required. By the end of the fiscal year, however, nearly all the commands were in barracks. Hospitals have been established or are in process of construction at Havana, Pinar del Rio, Guanajay, Camp Columbia, Matanzas, Paso Caballo, and Sagua la Grande. Two hospitals in Havana were used as general hospitals for the Division. One of these, known as United States Military Hospital No. 2, situated at the Vedado, was used for officers and civil employees. The necessity for it having passed, it was discontinued July 31st. The other, United States Military Hospital No. 1, is the old Spanish Military Hospital of Alfonso XIII, situated on the Principe Hill. This hospital has been described by the chief surgeon of the Division of Cuba, as follows:

> Before the evacuation by the Spaniards, it was in a very unsatisfactory condition. Several of the pavilions had become infected with yellow fever, smallpox, and parasitic diseases, largely owing to the overcrowding consequent upon the war. Each building had its own cesspool, and the overflow was supposed to drain into the sea; but it was afterwards discovered that from neglect, or other causes the main pipe was obstructed and the overflow emptied within a short distance of the hospital. As the cesspools were not cemented, the soil in the vicinity had become soaked with fecal matter. The odor from the privies in some of the wards was offensive, and none of them were supplied with portable or fixed bath tubs. The grounds were not properly policed, and but little provision had been made for surface drainage. The location and general plan of the hospital were good, excepting the drainage system. Extensive renovations and additions have been initiated and in part completed. Some of the buildings which were old and rotten were torn down. The others were most rigidly and scrupulously disinfected, whitewashed, painted, repaired, and refloored. The cesspools were disinfected and sealed up. A complete drainage system, with bathrooms and water-closets, was installed. The grounds were cleansed, policed, and disinfected where they appeared to require it. All of this has been costly and much of the work is of a character which makes no show; but it has given and still gives remunerative employment to native laborers, who in default of this might have become public charges. When the projected additions and improvements are finished, this hospital will not be surpassed by any institution with which I am acquainted, and will be a noble monument of the American military occupation. In addition to taking care of the sick, it serves as a depot and training school for the hospital corps (which, composed as it is of recruits, needs extensive preparation before it can be relied on to fulfill its duties), a school for noncommissioned officers for that corps, a training school for nurses, and a bacteriological and chemical laboratory, where analyses are made and observations on disease carefully conducted. It will shortly be lighted by electricity and supplied with its own ice plant and refrigerating chamber. The operating room is not, in my opinion, to be surpassed anywhere. A few native medical students are now, through the courtesy of the commanding officer, admitted for the purpose of perfecting themselves in special professional work and hospital administration.
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> Attached to the hospital is a steam disinfecting apparatus, and a large modern steam laundry with more than sufficient capacity for the work of the institution. Recognizing the fact that the troops are exposed to possible infection by the method which obtains at present of permitting each man to send his washing where he pleases, efforts are being made to do the laundry work for the garrison of Havana and Camp Columbia at this place. There are many difficulties in the way, which may prove insuperable, but I think in time they may be overcome. Up to this time the hospital has been free from infection, judging from the fact that no case of contagious or infectious disease has developed therein.

Since the occupation of the island by our troops in December, 1898, the percentage of sickness in the various camps and garrisons has been no greater than was anticipated, and, if we fortunately remain free from epidemic visitation, this percentage may be expected to diminish for some time to come, as the troops are now well sheltered and have become somewhat accustomed to the climatic conditions. Measles, smallpox, and cerebro-spinal meningitis appeared at several posts, but the adoption of proper sanitary measures speedily controlled these diseases. A serious outbreak of typhoid fever occurred among the troops at Puerto Principe, and another which, however, was kept fairly in hand and finally suppressed, in some of the regiments at Camp Columbia.

It is with pleasure that I report the passage of the yellow fever season of 1899 with the occurrence of so few cases of this disease, although our troops have been stationed within easy access to towns which are all more or less infected. Medical officers were required to observe all fever cases with the utmost care, to make examinations of the urine in each case, and to isolate any patient who had suspicious symptoms; and chief surgeons of departments were directed to select and recommend camping grounds, and to urge that the command be kept in a state of constant readiness to move should it become necessary to depopulate garrisons on account of infection. Occasional cases were reported at Guanajay, Camp Columbia, Sancti Spiritus, Matanzas, and Manzanillo; but there is a doubt as to the correctness of the diagnosis in some of these. A number of scattered cases occurred at Puerto Principe. It is evident from the history of these cases that the disease was contracted in the city and that the barracks remained free from infection; but for greater assurance of safety the entire command was removed to camp. At Santiago the adoption of proper measures succeeded in suppressing the outbreak, but not until 128 cases, of which 29 were fatal, had occurred among the troops. Among the victims of the outbreak were Capt. Paul Clendenin, assistant surgeon, United States Army (major, United States Volunteers), in command of the general hospital, and Acting Asst. Surg. F. W. Fabricius, the pathologist of the hospital.

An epidemic of smallpox among the people of the Holguin district of Santiago Province, was promptly suppressed by collecting and isolating the cases in pesthouses, burning or disinfecting all dangerous articles, and systematically vaccinating the people. None of the troops engaged in guard and police duty during the progress of this work became affected with the disease.

The report of Acting Asst. Surg. D. T. Laine (now major and surgeon of volunteers and attending surgeon headquarters Division of Cuba) on the hospitals of Havana, referred to supra, page 146, is as follows:

> I respectfully submit the following report on the hospitals, asylums, dispensaries, etc., in Havana, which I have personally visited and inspected, numbering in all, 30. Of the six military hospitals only one, San Ambrosio, is of a permanent character. While all the rest are of a temporary character, one, Alfonzo XIII, was erected as a military hospital. It is well situated and, although built of wood, there are certain parts which might be considered as permanent fixtures and could be utilized to advantage by the United States troops in the vicinity of Havana. I refer to the disinfecting apparatus, the steam laundry, and kitchen in this hospital; they are in good condition and comparatively new. It has also an electric plant and steam pumps for the supply of water.
>
> The civil hospitals are all suffering from the lack of funds on account of the war and the depreciation in value of their properties. Those situated outside of the city are difficult of access on account of the bad condition of the roads and lack of communication. None of them are supplied with ambulances or other means of transportation; the cabs and street cars are used for such purposes. There is only one hospital exclusively for the use of women—San Francisco de Paula. The Quinta de Higiene is the city hospital for women under government supervision.
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> As to contagious diseases, there is little or no care taken in their complete isolation. I refer especially to yellow fever and smallpox. In the private hospitals there are few or no wards, the tendency being to division into rooms into each one of which are crowded from two to four patients. Separate bathrooms or bathtubs in the wards are unknown. The bath house is, as a rule, in a separate part of the building.

There is a lack of proper sanitary arrangement in the hospitals and asylums visited, with the exception of a few. It is customary in all the civil hospitals and private asylums to pay fees to the physicians in attendance.

Trained female nurses are unknown; Sisters of Charity or men without any special instruction for such duties take their places.

The leper hospital is situated within the city limits, and the inmates are not completely isolated. Those who are able to use it are permitted the freedom of the city at least once a week.

The Government exercises supervision over every hospital, asylum, and institution in this country. It may be through the civil government of the island, or that of the province or municipality, but this supervision is in one way or another exercised over all.

MILITARY HOSPITALS.

No. 1.—San Ambrosio is the only permanent military hospital in Havana. It was built about two hundred years ago, and was originally used as a warehouse. It was bought by the Spanish Government about the year 1820. The building is of stone, of rectangular shape, two stories. It has been closed twice by the Spanish military authorities on account of its bad hygienic conditions. Several epidemics of yellow fever and smallpox have occurred within its walls. Its capacity is 1,000 patients, but it is now occupied only by about 500, as the whole of the lower stories are used as warehouses for military stores. It is situated in the lower part of the city, directly south, close to the arsenal, and on the unhealthy part of the bay. One of the sewers from the city runs by the walls of the hospital and is partly uncovered. The sanitary conditions in the interior of the building are of the worst. There are no sinks nor closets, the fecal matter and refuse being collected twice a day and carried out in large cans. Each ward has a large receptacle in the center in which the aforesaid fecal matter and refuse stand during part of the day. Through the lower galleries a small narrow-gauge railroad carries at different times during the day military stores, such as bacon, vegetables, etc., and at other hours dead bodies, refuse, and cooked foods. In the hospital there is a ward for insane officers and enlisted men of the army and navy. These are kept one year under observation and treatment. The cells of these unfortunates are in the most horrible condition of filth, dampness, and bad ventilation. Political prisoners who are sick are also sent to this hospital. The prevailing diseases among the soldiers have been malaria and dysentery. Within recent years five fatal cases of glanders have been admitted into its wards.

No. 2.—Alfonzo XIII was built in August, 1896, during the administration of General Campos. It is situated on the heights between La Pirotecnica and El Castilla del Principe, one of the highest points in the vicinity of Havana. The location is the best that could have been chosen for such a purpose. It is built on the pavilion plan, each pavilion of wood elevated 3 feet from the ground and well ventilated. They number 52. Some contain 70 beds, others 60, but the greater number only 25. The capacity of the hospital is 2,000, but as many as 3,000 patients have been crowded in. It has an electric-light plant and a steam laundry capable of washing the clothes of 5,000 patients; in fact, the entire washing of all other military hospitals in Havana is done here. The machinery is practically new, having been in use only two years. In connection with the laundry there is a large disinfecting apparatus of French manufacture, at present in very good condition. The kitchen is in a special building, where the cooking is done by steam. The water supply, from the Vento Canal, is pumped into two large tanks by means of a small engine. Each pavilion has its own cesspool or foso maura, the overflow of which runs directly to the sea through an underground pipe. Some wards have been specially set aside for yellow fever, smallpox, and other infectious diseases. The beds in the pavilions are of iron, stretched with canvas to take the place of mattresses; they are very serviceable, because so easily washed and disinfected. The prevailing diseases have been malaria and dysentery, yellow fever, and a few cases of smallpox. The itch and other contagious parasitic diseases have been as common here as elsewhere among the Spanish soldiers. These buildings should be destroyed.

No. 3.—Madera is a temporary hospital, situated in one of the suburbs of Havana, on the street Calsada de Carlos III. The buildings, formerly old barracks, are of wood, rectangular in shape, occupying an entire block. In the center are smaller detached houses for kitchen, laundry, etc. It was opened as a hospital in 1896. The property on which it is located belongs to private individuals. During the cholera epidemics of 1862 and 1868 it was used as a hospital. A detached building of stone, belonging to the Marquis Gonzalez, used as an annex of this hospital, will be closed in a few days, as the Spanish military authorities have come to the conclusion that it is infected with yellow fever. The following table gives the number of cases treated in this hospital and its annex since it was opened, in August, 1896:

Year.	Number admitted.	Number discharged.	Yellow-fever cases.	Deaths from yellow fever.	Deaths from all cases.
1896	5,431	4,389	413	162	239
1897	18,018	17,405	1,087	279	476
1898	9,773	9,091	107	29	773

The sanitary conditions are bad and the place exceedingly filthy.

No. 4.—La Beneficencia is a temporary hospital at the corner of Balascoain and San Lazaro streets. This building sheltered about 600 children, old men and women, but during the administration of General Weyler the inmates were removed and dispersed and the place transformed into a hospital for sick Spanish soldiers. At the time of the blockade the sick, then amounting to about 2,000, were removed, as the building is situated directly back of the Reina battery. There are now only about 800 sick present, as half of the building has been returned for the shelter of its former inmates. This hospital is noted for the number of yellow-fever cases which have been treated in it. The sanitary conditions are bad and some of the wards are extremely filthy. The drainage is carried directly into the bay. The capacity of the hospital is 1,000. (See No. 20.)

No. 5.—Regla. The large sugar warehouses across the Bay of Havana, in the town of Regla, belonging to the United Railroads of Havana, have been used by the Spanish military authorities as temporary hospitals during the past two years. As they are located along the most unhealthy portions of the bay, the mortality has been enormous. Of the five temporary military hospitals, this one has had the largest number of yellow-fever cases, not only because the buildings in themselves have been sources of infection, but being located at the terminus of three important railroads, all the sick coming from the country, especially those too ill to be moved any distance across the city, have been admitted to this hospital. There is a special ward in which are crowded all the cases of yellow fever, smallpox, and typhoid fever, but the isolation is as imperfect as is customary in both the military and civil hospitals of this country. Before these buildings are again used as warehouses they should be thoroughly cleansed and the wooden floors removed and destroyed. Two other warehouses near the fortress of Atares, across the bay, have been used for short periods as hospitals, but at present are unoccupied. As many as 5,000 patients have been crowded together in the Regla warehouses, but the number at present is a little over 2,000.

No. 6.—In the town of Marianao, Quemado station, a short distance from Havana, the Spanish military authorities had occupied and used as a hospital for convalescents, up to within a few days, the private residence of Francisco Duranona. It is a beautiful residence, marble floored, belonging to one of the island's wealthiest men. The sanitary arrangements are good, except that the bathrooms and closets are out of order from neglect and bad usage. If the house were cleansed and painted it would be all that could be desired, with the exception of the water supply, which is derived from a well located in the middle of the yard. The water supply of this town is drawn from wells sunk in the premises of each house.

No. 7.—The Nuestra Senora de las Mercedes was built in 1886 by private subscriptions and is at present sustained in the same way. It is situated about a mile outside the city of Havana, in the district of El Vedado, on a hill 48 feet above sea level. The surroundings and drainage are excellent. The hospital itself occupies an area of 15,000 square yards, and is built of limestone, one story in height, except a small portion immediately over the entrance, which has two stories. It extends in the shape of a cross, the horizontal bar represented by a gallery 400 feet in length by 13 in width, from which projects 10 galleries or pavilions, 5 on each side. The vertical bar contains the offices, chapel, dining room, bathrooms, and hospital kitchen. Each ward is 86 feet in length, 28 in width, 16 in height, with 12 large windows, 20 iron beds, and ventilators above and below. The hospital was built to accommodate 200 patients, but as many as 400 have been treated in it at one time. It would hold 300 comfortably. Each ward has two small rooms at each end, with one closet, but no bathing facilities. The bathrooms are in the center of the building. The floors are of hard pine and the walls and ceiling of plaster. The cellars under the wings vary from 10 to 5 feet, as the building is situated on the slope of a hill. There is a modern steam disinfecting plant in the hospital. Water is supplied from a deep well on the premises, but the Vento water is easy of access. There is no gas, but this or the electric light could be easily supplied. The drainage is direct to the sea through an underground pipe. There are no private rooms for patients. The rates per day in the wards vary from $1 to $5. The free beds number 70. Nineteen Sisters of Charity act as nurses. The attending physicians receive salaries, as is customary in most of the hospitals in Havana. Yellow fever cases are admitted to the wards, although there have been but very few this year. Patients suffering from smallpox are isolated in detached rooms situated back of the hospital, which, when not in use, are occupied by servants and attendants. The hospital was built much after the plan of the Manchester Infirmary, England, but is at present deficient in many respects. The expenditure of a few thousand dollars would bring it up to as high a standard as that of any modern institution. It is in debt to the extent of $110,000, but the municipality of Havana owes it about $150,000. This is by far the best constructed hospital in Havana.

No. 8.—San Francisco de Paula is the only woman's hospital in the city. It was built by private subscription, and is under the control and management of the Bishop of Havana. It was built by virtue of a legacy, one of the clauses of which required that the administrator of the hospital should be a Cuban priest, born in the city of Havana, and that the attending physicians, four in number, should be also native born. It was founded in 1665. The original building was destroyed in 1778 by a hurricane. Next year the present building was erected on the same site. It is located in the southeastern extremity of the city, in close proximity to the bay, and necessarily occupying one of the most unhealthy portions of the city. The building is large, two stories in height, built of stone, and rectangular in shape. It is divided into four wards, twenty-five beds in each. White patients occupy the upper story; the colored patients are below. It has both medical and surgical wards and a small operating room, not at all modern in construction. The sanitary arrangements, ventilation, and drainage are most deficient. The hospital can comfortably accommodate 100 patients, who may be admitted from all parts of the island. Attached to this hospital is a small obstetrical and gynecological ward of nine beds, the only institution of its kind in Havana. This was organized by the medical department of the University of Havana and is under its direct control.

No. 9.—San Lazaro. This leper hospital is located within the city of Havana and was founded in 1681 by virtue of a legacy from Pedro Alegre, a Mexican Jesuit, at that time a resident of Cuba. For this purpose he donated a large tract of land then far beyond the limits of the city. In 1714 the first building was erected on the site now covered by the present hospital. The land owned by this asylum amounts to over 100 acres, and as the city has extended in this direction, the value of the property has greatly increased. The institution at present has a claim of $300,000 against the Spanish Government for the seizure of the land now occupied by the Reina and Santa Clara batteries. This asylum is considered one of the richest in the island and has never received any support from either the civil or municipal governments. It is managed by a board of governors. Patients are admitted from all parts of the island.

The present buildings were erected in 1861, the main part being two stories in height, built of stone, rectangular in shape, and with a large courtyard in the center, in which there is a very fine chapel. Eight Sisters of Charity act as nurses and live in the building with the lepers. Some of them have been in this institution for over ten years, but no case of contagion has manifested itself among them. One priest is said to have contracted the disease which, however, did not develop until after his return to Spain. Besides the Sisters of Charity, there are fifteen hired attendants. The public is admitted daily to the chapel, but separated from the lepers by iron gratings. During the afternoon and evening patients who are able to walk sit in the corridor or at the entrance where they come in direct contact with the people. Those who have families in the city are permitted to visit them once a week. The public is allowed to visit the institution at certain hours. There are at present 80 patients in the institution, about 50 of them are native Cubans and the remainder negroes, Spaniards, and Chinese. The youngest inmates are three boys, brothers, whose ages range from 10 to 14 years. There are 17 women, who are kept in a separate department of the institution.

The building is well constructed, and the drainage and ventilation fair. Two patients occupy each room which is subdivided into three apartments, each patient having thus one apartment with a parlor, yard, and water-closet in common with his neighbor.

There is more leprosy in the island of Cuba than is found in this asylum, as only such as are unable to work or help themselves find their way here.

The following table shows the number of patients admitted to this hospital since the year 1831:

1831 to 1840	170
1841 to 1850	156
1851 to 1860	135
1861 to 1870	129
1871 to 1880	189
1881 to 1890	140
1891 to 1898	174
Total	1,093

Capacity of the hospital, 300; at present, 80 patients.

HOSPITALS BELONGING TO SPANISH MUTUAL BENEFIT SOCIETIES.

No. 10.—Quinta De Dependientes or Casa De Salud La Purisima Conception is situated in the district of Cerro and managed by the Asociacion De Dependientes del Comercio de la Habana, which has a membership of over 10.000. This hospital is made up of a group of buildings and is the largest of its kind in Havana. It can accommodate 500 patients. The rates for those not members of the association vary from $2 to $5 per day. There are seven two-story pavilions, built of stone, and subdivided into rooms by wooden partitions, each room occupied by from two to four patients. The sanitary condition in the one of most recent construction is fairly good. This one has been selected for typhoid and yellow fever cases. The smallpox department is in a detached building. The location of the hospital is not good, as the ground is low and must be damp in the rainy season. The bath house is of modern construction and the operating rooms are, I believe, the best in Havana. Any physician or surgeon is permitted the use of this hospital for his patients by paying the usual rates for those not members. Many yellow fever cases are treated yearly in this institution, with a mortality of never less than 16 per cent. In 1895 there were 605 cases with 94 deaths.

No. 11.—Quinta La Covadonda is managed by the Spanish society called El Centro Astriano. It has a membership of about 5,000 with yearly dues from $18 to $24. All members of the society, besides enjoying mutual benefits, are admitted in case of sickness free of charge. Persons not members are charged from $2 to $5 per day. The hospital can accommodate 200 patients comfortably. The administration building was an old homestead. The grounds cover an area of about 60 acres. This was considered one of the most beautiful residences in the Cerro, being thickly wooded and very picturesque. The pavilions, of which there are four, are of recent construction, built of sandstone, except one, which is of wood. The interior arrangements are not good, the wards being subdivided by wooden partitions into rooms, each containing two or three beds. Each pavilion will accommodate 40 patients. There is a detached building used for all contagious diseases, except yellow fever, which is treated in the general wards. There is also a separate building for cases of tuberculosis. This hospital is exclusively for men.

No. 12.—La Benefica is situated in the district of Jesus del Monte, and is managed by the Spanish mutual association called El Centro Gallego, of Havana. This society, founded in 1879, has a present membership of about 500. The hospital was opened in 1894. The main building was formerly a private residence. Two wings have since been added. They are of modern construction, brick, covered with plaster, two stories in height, with deep cellars, which is unusual in this country. These are occupied by servants and attendants. There are 70 rooms in these buildings, capable of accommodating about 150 patients. The rooms are large, but poorly ventilated. The water-closets are of modern construction, but extremely filthy, lacking in light and ventilation. The sewerage empties into a small stream which flows into the lower part of the Bay of Havana, and on account of its close proximity to the latter the situation of the hospital is unhealthy. Up to within a short period yellow-fever cases were not isolated. They are now sent to the smallpox department, a small wooden building detached from the others. Rates, $2 to $5 per day. The capacity of the hospital is about 270.

MUNICIPAL HOSPITALS.

No. 13.—Aldecoa is 4 miles from Havana, a few minutes' walk from the Cienega station, on the Villanueva Railroad. The buildings are rectangular in shape, constructed in a modern manner of stone, on an elevation. Some old sheds at present used for reconcentrados were part of the brick kiln which formerly occupied the site. These buildings were originally intended for sick prisoners and for the insane from the city jail, who must be kept under observation for three months before being sent to Mazorra, the insane asylum of Cuba. Since 1897 some of the reconcentrados from Los Fosos have been sent here, and they now number over 130. Men, women, and children have been crowded into this old shed and are kept in a miserable and filthy condition. The death rate among them is enormous. In the hospital proper there are four wards with good cement and tiled floors, although the sanitary arrangements are bad and the ventilation deficient. The water is drawn from La Zanja, a ditch which flows through the district of El Cerro, where it is polluted. The water could easily be obtained from the Vento Canal, which is but a short distance away. For the past year none of the employees or physicians have received pay for their services. A contractor supplies the food at the rate of 45 cents per head per day, insisting, as do all other contractors employed by the municipality, upon daily payments. The capacity of this hospital is about 150 beds. It could be placed under fair sanitary conditions, as the location is good. There are no separate wards for smallpox or other infectious diseases, as glanders, of which there have recently been two cases.

No. 14.—Nuestra Senora De Los Angeles, formerly known as La Integridad Nacional, was originally a college for boys, and was used as such up to the year 1870. From that date to 1894 it became a private hospital under direction of Dr. Garcia. It then passed into the hands of Drs. Belot, Burgess, and Borrich, who made it a general fever hospital. It was here that the American yellow-fever commission pursued many of its studies. Up to the year 1897 smallpox cases were freely admitted and treated in these buildings. During all this year it was occupied by a Spanish guerrilla force, who vacated the place September 1, when the municipality of Havana took possession and established a hospital for the reconcentrados from Los Fosos. The buildings are about 1 mile outside the city limits, on the slope of the hill upon which stands Castillo del Principe. It is impossible to describe the filthy and insanitary condition of this hospital. The main building has about eighteen rooms with from four to six patients crowded in each. The halls are in the same condition; the ventilation is poor and dampness excessive. The sewerage empties into a ditch which communicates with a stream flowing into the upper part of the bay. There are at present 430 men, women, and children present. Eighty-eight patients died during the first eighteen days after the opening of the hospital. The Sisters of the Poor act as nurses, with municipal doctors in attendance. About 80 per cent of the patients are suffering from the effects of starvation. The hospital was established to relieve the overcrowded condition of Aldecoa, and for the relief of the reconcentrados from Los Fosos.

No. 15.—San Jose Asylum or the House of Correction of the municipality was formerly the insane asylum which has been transferred to Mazorra. Two classes of boys are sent to this institution, orphans by the municipal authorities and boys who have been convicted or who are detained for trial. These are kept by themselves. Their ages range from 5 to 17 years. They wear a special dress to distinguish them from the orphans. Many boys are sent here by their parents or guardians because of incorrigibility. The boys are taught a trade and also to read and write. The building is situated just back of the leper hospital. The sanitary conditions are very poor and the sleeping accommodations horrible, blacks and whites being crowded together in one room, and sleeping upon tiers of boards, one above the other. The capacity of the asylum is 200.

PRIVATE HOSPITALS.

No. 16.—Quinta Del Rey is situated in the Cerro, and is under the direction of Dr. Bueno and three other physicians. It is one of the oldest private hospitals in Havana. It has recently been repainted and cleaned. The attendance and general sanitary conditions are good. The hospital is rather poorly situated, owing to the lowness of the ground. In former years smallpox and yellow-fever cases were freely admitted. There is no special isolation made for yellow-fever cases, but this is not unusual in Havana. The administration building has two stories, in the upper one of which is the department for women and an operating room. Rates vary from $1.50 to $5 per day. The capacity of the hospital is about 215 patients. There are no wards.

No. 17.—Quinta De Casuso is a private sanitarium in the district of Jesus del Monte, for the treatment of surgical diseases in women. The capacity is about fifteen beds, and is under the control of Dr. Gabriel Casuso.

No. 18.—Quinta De Canongo in the Cerro, formerly a private residence, is situated in one of the highest and healthiest portions of this district. It is in fairly good sanitary condition, except for the lack of modern water-closets. As a hospital it has never been used for other purposes than the treatment of nervous disorders. The only objection to its location is its distance from the city. Dr. Emilio Borrich is the physician in charge. Capacity, twenty-four beds. It is known as the Quinta De Bernandino.

No. 19.—La Misericordia, an asylum for old men and women, in the district of El Cerro, Buenos Ayres No. 11. It is a private institution, but the inmates are principally the poor of Havana, who are sent here by the municipal authorities, who pay $10 per month for each. The building was originally an old private residence; it is now in a state of dilapidation and decay, and the sanitary conditions are very bad. Its capacity is about 150.

No. 20.—La Beneficencia is the largest orphan and foundling asylum in Havana. The buildings are of stone, two stories in height, occupying an entire block. Its location is at the corner of Bellascoain and San Lazaro streets. This asylum was founded by private subscriptions and is so maintained at present. It was built in 1792. There is an additional building, which was put up recently, as an asylum for old men and women, and which is managed in connection with the remainder of the institution. The inmates are principally the poor of Havana, for the maintenance of which the municipal authorities pay $10 per month per person.

Since 1825 this asylum received $200 from each drawing of the lottery, the object of which being the institution of a fund from which a certain portion was to be given to each orphan girl upon her marriage. General Weyler in 1896 issued an order closing this establishment as an orphan asylum, at the same time opening it as a military hospital. At that time the inmates, some 600 men, women, and children, all told, were dispersed. Since the 1st of September, 1898, half of the building has been returned to its owners, and there are at present 459 inmates. The capacity of the hospital is 1,000. The municipality pays $120 a year for children, old men and women, and $300 per year for each foundling.

No. 21.—La Domiciliaria is situated in the district of Jesus del Monte, one of the highest elevations around Havana. It is an institution managed by the Sisters of Charity for orphan girls from 6 to 12 years of age. They are fed and clothed, and receive an elementary education. The capacity is 120 inmates, with nine Sisters in charge. Not only is this institution the cleanest and neatest around Havana, but it boasts of the best sanitary arrangements of any of the institutions here.

No. 22.—Quinta De Sandovenia, a home for old men and women. The origin of this asylum was a legacy of $100,000, left by Mrs. Susana Parejo. The building was formerly a private residence. It is under the management of the Sisters of the Poor. The property is owned by them, and the expenses are met through public charity. They receive no help from the municipal authorities, although the former have at various times appropriated $20 per month for short periods. It can accommodate 150 inmates comfortably. The yearly mortality varies from 70 to 80. The buildings are in fair sanitary condition, although the house is on low ground. They are at present in great need of funds.

No. 23.—Lee Asylum, situated in the district of El Cerro, was founded by the Red Cross Society and the Christian Herald, of New York, and named in honor of General Lee. The building was formerly a private residence. It is now occupied by about 110 children. The number should never have exceeded 50; but during the blockade as many as 190 were crowded together in this building. They are all from the class of reconcentrados, and most of them were admitted in such a state of starvation as to be beyond hope of recovery. This institution has undoubtedly done much good and been the means of saving many lives, but it is now in such a state of neglect from lack of funds that it should be closed if sufficient funds be not supplied to properly manage it. The sanitary conditions are most deplorable. The cesspool is overflowing and for lack of funds can not be cleaned. The attendants and physicians have not been paid for several months.

HOSPITALS AND ASYLUMS CONTROLLED BY THE CIVIL GOVERNMENT AND MUNICIPALITY.

No. 24.—Quinta De Higiene is situated in the district of El Cerro. It is under the control of the government, and solely for the treatment of specific affections in women. It was opened in 1873. The patients, blacks and whites, are sent from the different houses of prostitution by the doctors of hygiene, of whom there are six in Havana. The inmates pay their board, and from this money a fund has been established for an infant asylum. The buildings, formerly a school for industrial art, are one story in height, of stone, rectangular in shape, with a large court in the center. They are in fair sanitary condition. They consist of several small wards, each containing fifteen or twenty beds. The capacity is 120 beds.

No. 25.—El Nino Jesus, an orphan asylum opened eight months ago for the relief of the children of the reconcentrados. The building was formerly a private residence, situated in El Cerro. The funds for this asylum are partly derived from the Quinta de Higiene and partly from the municipality. There are about 150 children present, who appear to be well fed and clothed; but the building is not suited for its purpose. Sisters of Charity are in charge.

No. 26.—The asylum Fernandez De Castro has only recently been opened for the same purpose as the above, and is sustained chiefly through the efforts of the present civil governor. It is situated in Jesus del Monte, and has a capacity of about 100.

No. 27.—A dispensary for children, under the control of the bishop of Havana, is situated at the corner of Habana and Chacon streets. Several thousand children are attended to here during the year free of charge.

No. 28.—The dispensary for children on Estebes street, Cerro, is under the management of the Society of Pilar. It is a charitable institution, and does much good among the poor in that section of the city.

No. 29.—Policlinica De Lopez is a general dispensary, but patients who are able to pay a moderate fee are obliged to do so.

No. 30.—The bacteriological laboratory of Dr. Juan Santos Fernandez, 105 Prado street, is the only one of its kind in Havana. It was founded by this gentleman in 1887 in connection with the medical journal La Cronica-Medico-Quisurgica. The laboratory is composed of several departments—bacteriology, histology, clinical analysis, etc., also one for the treatment of hydrophobia and the manufacture of the different serums, such as the antidiphtheritic, malleine, etc. More than 1,500 persons who have been bitten by hydrophobic animals have received treatment, with a mortality of 1 per cent. The antidiphtheritic serum is prepared here by the method of Roux, and has antitoxic powers equal to 500 units. This laboratory has also rendered valuable service to the administration of justice. Over 550 examinations have been made in medico-legal cases. The faculty is composed of ten physicians, who have charge of the different departments.

No. 31.—There are three private vaccine centers besides the government one.

DEPARTMENT OF HAVANA.

This department was established January 1, 1899. Since the withdrawal of the volunteers the mean strength has been 1,987 men, belonging to the Seventh Cavalry, Second Artillery, and Eighth Infantry. The troops were at first sheltered in tents in and about the city, but since June 30, 1899, they have been quartered in buildings which were cleaned, repaired, disinfected, and fitted up for their accommodation. They are scattered in small commands of one or more companies. Each of these has a hospital of a few beds, in which slight and emergency cases are treated. No general hospital has been established in the department, because serious cases occurring among the troops can be cared for in the military hospitals of Havana, under the control of the Commanding General of the Division of Cuba.

A yellow-fever hospital of 100 beds, capable, if necessary, of being expanded to a capacity of 200, has been built at Las Animas. This was intended originally as a military establishment, but since, fortunately, there has been so little occasion for its use by the troops during the past summer, civilians as well as soldiers affected with yellow fever have been received in it for treatment.

The utmost care has been taken to detect the earliest evidence of the existence of the infection of yellow fever in any of the commands, and all arrangements have been made for the prompt removal of an infected detachment, company, or garrison to an uninfected locality, with shelter in tents or in recently built and hitherto unoccupied buildings. An account of the outbreak of yellow fever in Cabana Fortress has been given on page 261.

Maj. William C. Gorgas, surgeon, United States Army, the chief surgeon of the department, in addition to his duties under Army Regulations, has been required to exercise a general supervision over the hospitals of the city, but he has no official connection with the sanitation of Havana outside of its military garrison.

DEPARTMENT OF THE PROVINCE OF HAVANA AND PINAR DEL RIO.

When our troops, in December, 1898, and January, 1899, occupied the Provinces of Havana and Pinar del Rio, each of these constituted a separate military department. In April, 1899, the provinces were consolidated into one department, and about the same time the return of the volunteer regiments to the United States for muster out and their replacement in Cuba by regular troops was approximately completed.

The Seventh Army Corps, then consisting of two divisions having an aggregate strength of over 14,000 men, occupied a site near Quemados, afterwards known as Camp Columbia, about 6 miles from Havana. During their stay in this camp the volunteers were sheltered under canvas. The tents were floored, but as lumber was scarce many of the regiments were unprovided with this essential to the health, cleanliness, and comfort of camp life for more than a month after their arrival. Nevertheless, at this time the men were in better health and the regiments in a higher state of efficiency than at any previous period in the history of the organization.

The provision made for the care of the sick of this army of occupation was of the most generous character. It was calculated to meet emergencies which fortunately did not arise. Before leaving Savannah, Ga., each regiment was provided with a fully-equipped hospital of regulation size, and the division hospitals were manned and supplied with everything necessary for the care of 1,000 patients. The report of the personnel of the hospitals February 1, 1899, shows that there was present for duty:

Commissioned medical officers	47	Hospital Corps, privates	477
Acting assistant surgeons	37	Contract nurses, female	72
Line officers (quartermasters, etc)	4	Contract cooks	18
Hospital stewards	38	Teamsters	33
Acting hospital stewards	50		

At Camp Columbia the regular troops occupied the camps vacated by the volunteer commands. They consisted of the Eighth Infantry, the headquarters and eight troops of the Seventh Cavalry, and two light batteries of the Second Artillery, with a mean strength, from May to September inclusive, of 1,764 men. Frame barracks were constructed for their accommodation, but these were not finished and occupied until the end of July. The grounds were left by the volunteers in a fair state of police, but, according to the report of the chief surgeon, during the two and a half months occupied by the construction of the barracks, about 1,000 Cuban laborers defiled the surface at will, the sinks being inadequate and ill kept and their use not being enforced. These insanitary conditions account for the occurrence of typhoid fever among the regular troops during the past summer. (See p. 274). A water supply had already been provided for the camp by a 6-inch main from the Havana distributing reservoir. The water is from Vinto Springs, pure but somewhat hard. No facilities for bathing have been provided, but some of the commands have improvised shower baths under canvas. The trough system, (see p. 210) is now used for the removal and disposal of excreta, and since the change from tents to barracks and from the pit privies to this safer method of disposal of infectious matters there has been a considerable diminution in the number of typhoid fever cases. An excellent sewer was constructed for the camp and barracks by the Second Volunteer Engineers. That it was not put to use is, to say the least, unfortunate. Its prompt completion and utilization would certainly have exercised a beneficial influence on the health of the troops by reducing the spread of the typhoid infection.

At Pinar del Rio barracks the mean strength since the consolidation of the provinces has been 944 men, belonging to four troops of the Seventh Cavalry and eight companies of the First Infantry. These now occupy the Spanish barrack buildings, which have been cleaned, repaired, and disinfected.

The water supply is hauled in wagons from the Guame River and filtered through Pasteur-Chamberland filters for drinking and culinary purposes. Two filter beds, each affording 800 feet of filtering surface and capable of yielding 40,000 gallons per diem, have been constructed, and when the steam engine and pumps estimated for have been received, a system of natural filtration will be put in operation. The Smith crematory was used at this post for the disposal of excreta. At first the reports concerning its value were favorable. It was said to dispose of all excrement and a reasonable amount of garbage in a simple, efficient, and economical manner, but recently doubts have been cast on its durability.

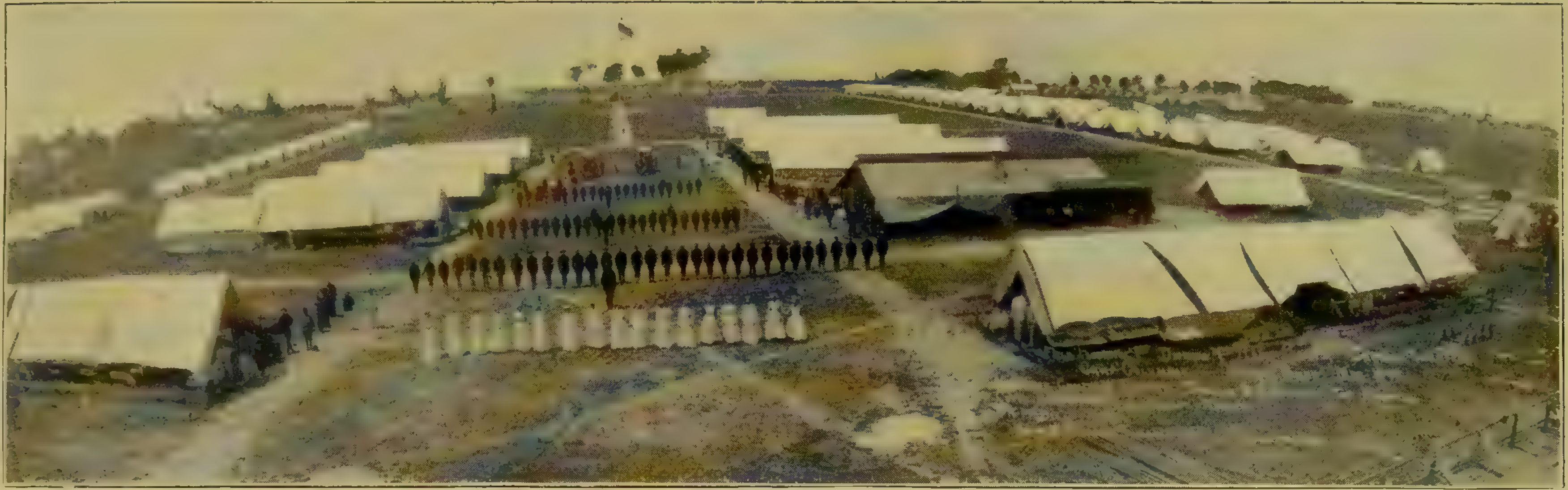
At Guanajay, where the command has been a battalion of the First Infantry with a mean strength of 364 men, the conditions in general are similar to those at Pinar del Rio, but new barrack buildings have been constructed; the water supply is from a spring, and the latrines are fitted with galvanized iron receivers.

Malarial fevers in this department have been the cause of a large sick rate, and typhoid fever the cause of a large death rate.

The hospital at Camp Columbia is still in tents, but the new wards are nearly ready for occupation. New hospitals have been constructed at Pinar del Rio and Guanajay, under the medical supervision of Maj. William L. Kneedler, brigade surgeon, Volunteers; that at Pinar del Rio has a capacity of 200 beds, which may be largely increased in emergencies by closing in the verandas with canvas; the buildings are of Georgia pine, roofed with corrugated iron. The medical officer advocated the adoption of tile roof, or, failing in this, to have felt placed between the iron and the roof proper. There is a central two-story administration building with four radiating wards. The kitchens and mess halls are connected with the wards by covered pathways. The buildings are on brick piers, and the workmanship throughout is said to be of the best quality. The Guanajay hospital is constructed on the same plan, but has beds for only eighty patients.

DEPARTMENT OF MATANZAS AND SANTA CLARA.

On the organization of the Department of Matanzas the brigade hospitals of the Second Division, First Army Corps, were consolidated into a district military hospital. A handsome building on a pleasant site overlooking the city and bay was fitted up for this purpose. It afforded room for fifty beds, but it was expanded by comfortable tent pavilions to accommodate one hundred more. In addition to this there was established in connection with each regiment or detached command a small hospital of ten to twenty beds, each complete in itself as regards personnel and equipment, and in the city a large three-story building, known as the Santa Isabel, which had been used as a military hospital by the Spaniards, was thoroughly cleaned, dis-



HOSPITAL, FIRST DIVISION SEVENTH ARMY CORPS, CAMP COLUMBIA, QUEMADOS, CUBA. (THREE COMPANIES OF HOSPITAL CORPS AND TRAINED NURSES.)

nfected and renovated in case the district hospital should prove nsufficient for the uncertain needs of the future.

Seven towns in the province of Santa Clara were garrisoned by our roops. At first these commands were sheltered under canvas, but hey are all now comfortably housed in barracks vacated by the Spanish troops, or in wooden pavilions constructed by the quarternaster's department. In December, 1898, Maj. Lewis Balch, brigade surgeon, United States volunteers, inspected these towns to determine heir sanitary condition and make recommendations from the medical point of view concerning the location and establishment of camps. The following report of the city of Trinidad shows the care given to the discharge of this duty:

Terrain.—Trinidad, on a hillside fronting the ocean and about 3 miles inland, having a general elevation of about 250 feet above the sea level, is well placed for cleanliness and drainage. To the westward across a valley a mile or more wide, through which flows the Aflaba River, is a high mountain range somewhat bare of heavy foliage, but, it is stated, occupied by coffee plantations. To the north is a high hill, rising quite abruptly from the town and very abruptly from the valley to the west. This hill is the highest point on a ridge running in a northerly direction dividing into two ridges, the lesser sloping toward the sea in an easterly and southerly direction, making, as it falls to the level, rolling slopes. This part is also bare of heavy timber, having chiefly a growth of underbrush varying in height from a few inches to 10 feet. Even this brush is quite sparsely scattered. The soil is red, ferruginous clay, the rock and gravel coming to the surface in many places.

City.—The city's population is estimated to be between nine and twelve thousand. The streets are narrow, many crossing at right angles, generally paved with irregular cobblestones, having no crown, but sloping to the center, where a sort of gutter is made with narrow flags, laid lengthwise on flatter cobbles. The sidewalks are narrow, and both pavements and walks are out of repair. There are two squares or plazas, one in front of the city hall, in the flatter and lower part of the town, and one in front of a large church on the hillside.

The fall of the land extends to the sea, no place, I am informed, being dead level.

The buildings are generally but one story, about 20 feet high. Some are two stories, averaging 40 to 50 feet from ground to roof, but I have seen none of greater height except churches. Houses are of brick, with stucco outside, and painted in various colors; others are of mud walls made over a wattling of cane and covered outside with plaster or stucco.

The streets, for a Spanish-American town, are very clean. This is accounted for by the rains washing them and carrying all refuse away. There are no sewers, waterworks, street cleaning, or street lighting on any systematic plan. A few oil lamps are placed about, but most streets are dark.

Water.—At present there is a small pumping station near the river on the southwest aspect of the town. The intake pipe is above a very small dam formed of loose stones, with in one place an outflow. The intake is protected from coarser impurities by a strainer. Guards are kept on duty to prevent washing or bathing above the intake, but almost 500 yards upstream a ford crosses, and I am informed people do bathe farther up. Some houses are on the banks of the river and its tributaries up the valley, the refuse from which probably gets into the water, if not by direct flow, by rain washing. A camp of insurgents, about 150 in number, is also on the stream 2 miles or more above the intake. This camp can be moved at any time, as the colonel commanding has so offered. From the pumping station the water is sent to two large iron tanks which are under cover about a quarter of a mile from the river. Here it is drawn off into barrels mounted on carts and peddled about the city.

Most of the inhabitants take their water from cisterns built underneath their houses and opening into the courtyard. The supply is the rain, collected from the roofs, and as the supply is to last through the dry or winter months the cisterns are necessarily large. The water is generally carefully taken, the first fall being allowed to wash the roof, after which the flow is turned into the cistern. The more intelligent of the inhabitants boil and filter this water, the filters being of porous stone from 4 to 6 inches in depth, allowing of slow percolation. The roofs are all tiled and well adapted for collecting water.

The present place of taking water from the river is unsatisfactory. The water is clear, but without chemical or bacteriological examinations its safety as a supply can not be determined. From visual inspection the chances of pollution are numerous and of such character as to render the source suspicious. The commanding officer of the troops here has been advised of these conditions, and also that all water used for primary purposes by the command should be boiled and, if possible, also filtered.

A source of pure water is said to exist in the San Juan River, which rises high up in the mountains across the valley to the west some 5 miles distant. Its source is so high that gravity would carry it to the highest point of the town without other aid. The water is stated to contain magnesia in considerable quantities and for the first two or three days' use to act upon the bowels as a mild laxative. After that it loses this effect. It is further stated there are no sources of pollution near to the river. When the stream reaches the valley, it flows into the Allaba. I can not state as to the quantity of water obtainable from this source. Colonel Brown, commanding the troops here, has said he will have the San Juan examined by an officer and a report made upon it for a water supply.

It would probably be feasible to pipe this water, if the supply is found sufficient, across the valley and up to the high hill above the town, where at present is an abandoned telegraph and signal station, whence, from a small reservoir it could be carried in distributing pipes into the city and camp. The cost of this I can not estimate with any exactness, but would say approximately it would be from $30,000 to $50,000. It would, however, insure a safe supply.

Sewerage and sewage disposal.—Of sewers there are none. Houses are furnished with vaults which vary in size, some being very large, others small. They are cleaned out as necessity arises—that is, when they are full. In some houses chloride of lime is placed in the closet and thrown down after each using.

Owing to the situation of the city, a system of sewers could be easily planned, but the laying of them would be another matter, as, judging from the country close to and around the city, a good deal of rock cutting would have to be done, especially in the upper parts. A fall could, however, be obtained almost to sea level or to the lower reaches of the river, and if a gravity supply of water was put in, intermittent or constant flushing could be arranged for, insuring cleanliness of the mains. Privy vaults could then be done away with and all sewage be carried off through proper connections. Drainage is over the surface.

Garbage.—There is no regular method for collection or disposal of garbage. It is carried away and fed to pigs. In other cases it is thrown into the privy vaults. What gets into the streets or yards in the poorer parts of the town the pigs and buzzards eat.

Street cleaning.—None. The inhabitants trust to rains and the natural scavengers, the buzzards. It would cost but comparatively little to clean the city's streets; being narrow, they could be more quickly swept. Dry sweeping with carts to carry away the dirt would be better than watering the streets. Labor could be procured at very cheap rates and at the same time much destitution relieved. At present, in the poorer parts of the town, pigs are allowed to range at will. This does not add to cleanliness, except in so far as the pigs eat up any garbage they may find.

Health conditions.—Trinidad is said to be very healthy. It is stated that no yellow fever has been seen here, except some sporadic cases. Others say that the Spanish troops had yellow fever last summer, but there was no spread of the disease. Malaria is always more or less prevalent, but not so much as in other places lower in situation. A calentura (as well as I could make out the name) is a fever which, from its description, I should consider typhoid, exists also, but not in epidemic form. But few pectoral diseases are met with. It is stated persons in ill health come to Trinidad to recover.

Wednesday morning, the 7th instant, I went with Lieutenant-Colonel Biddle, United States Volunteers, Chief Surgeon First Army Corps, and looked for camp sites. It was decided that the rolling slopes east of the town furnished excellent places for camp and gave chance for moving, if found necessary, without a great expenditure of labor or money. The difficulty is to supply water in sufficient quantity. The present pumping station is inadequate to send water either so far or so high, neither engine or boiler being of sufficient power. Should this site be selected, measures would have to be taken to obtain water.

The present camp is located on ground having but little slope, about 150 feet above sea level, and about a quarter of a mile south of the town. Water can be carried here by the present pumping facilities when piping is laid, but it is considered the ground is not desirable as a permanent site. In my opinion it should not be occupied longer than absolutely necessary, although it is fair to say it may prove to be perfectly healthy.

Sinks should not be dug. The soil is apparently ill adapted to deal with excreta. As soon as the lumber is brought up from the ship, it has been suggested to the commanding officer that dry-earth closets be built. Mould can be obtained a short distance from the camp.

Recommendations.—To insure the health of the troops in this province, necessary sanitary work should be done quickly. Water in sufficient quantities for all wants is an absolute requisite. Much can be done within a few days after the troops land if means and authority are given to the general commanding the district, but if permission to arrange for these necessary and important sanitary needs must wait until reports can be made to general or department headquarters at Washington, not only most valuable time will be wasted, as communication is slow at the best, but the weather in which such preventive work can best be done will have largely passed and the hot and sickly season will be so near at hand that the influence of what little can be accomplished will not be felt to any appreciable extent. It is respectfully recommended, therefore, that at least $5,000 for each camp be placed in the hands of the general commanding the province to be used by him for the needs of the troops and the furthering of better sanitation in camps and towns.

The camps are near towns. Disease is to be feared from these towns, not from the country or mountainous districts. It is, therefore, just as necessary that sanitary measures for prevention, the cleaning of streets, garbage collection, disinfection, reports of contagious disease, its location and character, the isolation of infected persons or things, and such like measures be taken, as it is to have camps pitched in healthy localities and properly policed. In fact it is more important, for the camps are not centers of infection in the first instance. Therefore it is that prompt sanitary measures should be taken the moment occupation is accomplished. The towns can not supply the necessary funds. They have none themselves, and until their revenues reach the point where they are in excess of the immediate needs of the place, expenditures for the protection of health will have to be made by the Government if it is expected to carry on the garrisons with the minimum amount of sickness and loss of life.

It is further recommended that what is necessary to be done in reclaiming towns from their present insanitary condition be decided upon by a board to consist of an engineer officer and a medical officer conversant with sanitary work. Their report should be made to the commander of the province and acted upon at once, under his approval; for time, as already said, is of the utmost importance. Labor can be procured very reasonably. In many cases the people will work for their food. The employment of those suffering from want will aid in restoring better conditions, and also relieve those who now by voluntary subscription endeavor to lessen the hardships which have been forced upon this people. The further sanitation of cities, such as drainage and sewerage, water supplies, lighting, etc., can be supplemental reports forwarded to the department concerned, but the immediate requirements should receive prompt attention.

It is recommended that as soon as possible the present pumping station be enlarged sufficiently to enable water to be carried in pipes to the proposed new camp site. After reports have been made upon the San Juan River supply the question of permanent supply for both town and camp can be intelligently decided.

It is also recommended that lighter clothing be furnished the troops. This should be of cotton cloth of a light color and weight. The men can not now wear blue flannel shirts and their blouses; consequently they present a slouchy appearance when seen on the street. In addition to looks, the comfort and health of the men will both be conserved by lighter clothing.

It is also recommended that tea be made an article of issue in the ration. The drinking of large quantities of coffee is apt to cause disturbance of the chylopoietic system, which tea will not do, especially in hot climates. Rice also should be an article of issue and would form a valuable addition to the ration. It could be interchangeable with potatoes. It is further suggested that but two meals per day be served. Early in the morning, right after reveille, coffee and bread could be given, as men should not be exposed with empty stomachs, if possible to avoid it, to the early morning air. As work will be prevented by the sun between the hours of 11 a. m. and 3 p. m., breakfast, which should be a heavy meal, could be served at 11. At this meal tea should take the place of coffee. At 5 or 5.30 p. m., dinner, also a solid meal, with tea or coffee. In this way men would be fully fed and yet not tax their digestive organs so much as with three heavy meals. It is better to eat lightly in the Tropics than to eat heavily. These suggestions are respectfully offered as more applicable to summer service, but if such a plan is considered it is believed it would be well to begin before hot weather, as troops would become accustomed to such change more readily in the cooler than in the hotter weather.

The troops of the First Army Corps were in excellent health on their arrival in the provinces constituting the present military department. Although typhoid fever was prevalent among them while at Chickamauga Park, Ga., this disease had been thoroughly eradicated by successive movements to new sites and by improved sanitary conditions in each of the new camps.

The maximum force present in the two provinces, as reported by the commanding general, was 11,410 on March 20, 1899, but on account of the return of the volunteers to the United States there remained June 30, 1899, a strength of only 3,551 officers and men.

The sick rate in this department was relatively high, probably owing to the care taken in watching the progress of slight febrile ailments. The infection of measles was present in several of the commands; typhoid fever also was present, but under control. Fortunately only one case of yellow fever had to be reported. On April 12, 1899, a soldier of the Second United States Cavalry was found to be affected. He had been absent in the slums of Matanzas on a debauch for several days, so that, although the derivation of the infection could not be localized, it was held to be in no way connected with any unsanitary condition in the camp. He was at once removed to the district hospital, where he made a rapid recovery. His effects and those of his tent mates, as also the tents of the troop to which he belonged, were carefully disinfected.

The department commander, Brig. Gen. James H. Wilson, United States Volunteers, has referred in the following language to the exceptionally good health enjoyed by the troops under his command:

> While the health of the troops in this department has been exceptionally good, there can be no question that this, in a great measure, is the result of the thorough sanitary regulations which have been enforced, and I desire to express my full appreciation of the labors and constant attention given to this important subject by Maj. Frank J. Ives, chief surgeon, and by all the officers connected with this important work.

The sanitary regulations, to which reference is made in this citation, were issued in form of a circular from headquarters of the department July 8, 1899. They were as follows:

> *Barracks.*—One day in every week all military duties will be dispensed with, except the necessary guard and police, and a thorough disinfection will be made of those portions of the barracks used for living purposes, including dormitories, dining rooms, kitchens, amusement and orderly rooms, and porches. As far as possible all furniture, bedding, and clothing will be removed to the open air and exposed to the sun. The floors, after being thoroughly swept and cleaned, will be washed with a solution of bichloride of mercury (1 to 1000), or of carbolic acid 5 per cent. The walls, doors, and windows will be swept, special attention being given to all ledges where dust might lodge. All woodwork in these rooms will be mopped over with the above disinfectants for at least six feet from the ground. The bunks, if of iron, will be wiped over with the carbolic solution; if of wood, either that or the bichloride may be used.
>
> *Bedding and clothing.*—Bed linen, if employed, will be changed at least once a week. Blankets will be frequently inspected, and if found soiled or dirty will be immediately disinfected and washed. Each man will be provided with a bag of some kind for his soiled clothing, so that the same may be thus kept isolated until taken to the laundry.
>
> *Privies.*—The floors and seats of all privies will be mopped over daily with one of the above-mentioned disinfectants. All seats to privies must be provided with lids, and the ingress of flies carefully guarded against. The floors around urinals will be disinfected daily in a like manner.
>
> *Kitchens and dining rooms.*—All tables, meat boards, and other appliances will

be kept scrupulously clean, and as far as possible, when not in use, protected from flies by mosquito netting or some such material. Kitchen floors will be disinfected at least twice a week. Kitchen sinks will be washed with the disinfecting solution daily.

Disinfectants.—Unslaked lime will be freely used in the neighborhood of garbage receptacles, privies, urinals, and all places where there is likelihood of the ground becoming infected by splashing, spilling, overflowing of the contents, or careless throwing of waste from the kitchen. Lime will also be used frequently and fully in the neighborhood of buildings where there might be the slightest chance of infection.

Special precautions.—All soldiers are advised to remain in their quarters at nighttime and to avoid touching their lips before washing their hands after handling clothing or other articles when there is reason to believe these may be infected, or after passing the hand along a railing or other woodwork where infection may be apprehended.

Immediately upon being admitted to the hospital a soldier's clothing must be collected in its appropriate place and his bedding folded. No one should be permitted, without special authority from the company commander, to occupy his bed, nor to use his bedding.

At the first appearance of suspicious symptoms of yellow, typhoid, or other contagious or infectious fevers, all bedding, clothing, and effects of the alleged suspect should, under reliable supervision, be immediately and thoroughly disinfected. Should the suspicions be verified and the case develop, the quarters of the entire organization should be disinfected, together with such bedding and clothing of the occupants of the same room as may have become contaminated.

Although the sick rate in this department was relatively high, the death rate was low, as may be learned from the following statement by the chief surgeon:

In the department of Matanzas, and later in that of Matanzas and Santa Clara, there have been among the troops eight deaths in all. The causes of death were as follows:

Typhoid fever	2
Chronic Bright's disease	1
Accidental	3
Lightning	1
Suicide	1

Of the two typhoid cases, that of Lieut. H. E. Whitney, Second United States Infantry, was imported from the department of Havana, he reporting for duty while very ill, dying a few days later, so that practically only one man has died of disease contracted in this department.

In the province of Matanzas there has been no death among the troops except that of Acting Asst. Surg. John V. Hamilton, which occurred July 26, 1899, from uræmia resulting from chronic Bright's disease. This is an enviable record, difficult to surpass.

THE DEPARTMENT OF SANTIAGO AND PUERTO PRINCIPE.

The Department of Santiago was established by orders from the War Department dated August 10, 1898. At this time (see page 60) the Fifth Army Corps was yet encamped in the vicinity of the city. It was to be relieved by several regiments of United States Volunteer infantry, or so-called immune regiments. The Second Immunes, (Colonel Hood's regiment) arrived early in August. It was encamped for police duty in the city. The Third, Fifth, and Ninth followed, all landing at Santiago, while the Fourth arrived somewhat later at Manzanillo. These regiments had been raised in the expectation that most of their members were yellow-fever immunes, but subsequent experience showed that they suffered as much from tropical diseases as any other of our volunteer commands. Major Havard, chief surgeon of the department, doubted whether there were on an average more than three or four immunes in each company.

Outside of the arrangements for the reembarkation of the yellow-fever infected regiments of the Fifth Army Corps, the first effort of the chief surgeon of the department was directed to the relief of the hospitals at Siboney, which had become overcrowded with patients and convalescents. On August 17 the *Catania* sailed with 375 convalescents, including Majors La Garde and McCreery, the latter officer dying en route. On August 20 the *Bay State*, sent by the State of Massachusetts, in command of Dr. Burrell, carried away 120 sick men belonging to the Second and Ninth Massachusetts Volunteers, and on the 25th the *Berkshire* removed 350 men, all disinfected and provided with fresh clothing.

On August 26, after the reembarkation of the Fifth Army Corps and the relief of the Siboney hospital, as stated, the hospitals in operation at Santiago were enumerated by the chief surgeon, Major Valery Havard, surgeon, United States Army, as follows:

General field hospital, in command of Surg. S. Q. Robinson, on a high slope half a mile north of the Spanish military hospital, with comfortable canvas accommodations for 300 patients.

Nautical Club Hospital, in command of Asst. Surg. J. M. Kennedy, on the edge of the bay, in a roomy, finely ventilated building, with accommodations for 60 sick; especially reserved for city patients.

Hospital ship *Reina de los Angeles*, in command of Surg. L. W. Crampton, soon succeeded, on account of illness, by Asst. Surg. W. W. Quinton, specially intended for officers and noncommissioned officers; anchored in the bay, and with very nice accommodations for 75 patients.

Officers' hospital, in command of Acting Asst. Surg. C. H. Tebault, in a comfortable building on a high slope overlooking the bay.

Yellow-fever hospital at Siboney (reserve divisional hospital), in command of Surg. W. C. Gorgas, under canvas and with immense material, but at this time comparatively few patients and convalescents left. The former commanding officer, Surgeon La Garde, had returned, sick, to the United States, and was followed there by Surgeon Gorgas on recovering from typhoid fever in September, leaving Acting Asst. Surg. R. M. Myers in charge.

Yellow-fever hospital, in Bay of Santiago, established early in August under the direction of Dr. Orlando Ducker, to take the place of the Siboney hospitals, being nearer, more accessible, and much more completely isolated; capable of accommodating, under the roof of a long frame building and in tents, 150 patients, a number which has never been reached.

Observation station, in charge of Surg. F. J. Combe, not far from the field hospital, for the isolation and observation of all suspicious cases.

In addition to the above, there were many patients left in the field hospital of the Second Division (near Cuevitas) under Acting Asst. Surg. J. B. Sewell, and of the cavalry division (near El Caney) under Acting Asst. Surg. W. M. Perkins. The sick of the First Division, through what appears like indifference on the part of the division chief surgeon, had never been gathered into a field hospital, and were left wherever the regiments had camped. They were given immediate attention and in a few days all brought together on good grounds near the field hospital, under charge of Asst. Surg. W. B. Banister. The sick of the cavalry division were also brought near the same place, under charge of Acting Assistant Surgeon Perkins.

Military hospital.—The military hospital having been left very dirty and dilapidated by the Spaniards, vigorous work was at once begun to place it in a suitable condition to receive our sick; this was successfully accomplished, and early in September the field hospital was abandoned and its remaining sick transferred to the military hospital, which from that time became the general hospital of the department. The decision to use this hospital, in spite of our knowledge that it had been crowded with Spanish patients, and possibly infected with yellow fever, was not reached without much deliberation and the full assent of the general commanding the city and the department commander. It was believed that it could be successfully disinfected, and time has justified our belief.

Destruction of Siboney hospitals.—On September 8, a board of the medical officers, of which Asst. Surg. R. S. Woodson was president, was appointed to proceed to Siboney, make a thorough examination of all the property left at the hospitals, with authority to destroy by fire everything deemed infected; this destruction was effected a few days later, and thus ended the history of Siboney, witness of so much zeal and heroism and of so much misery and suffering. A few patients too ill to be removed still remained in the vicinity for two or three weeks, in charge of Acting Asst. Surg. R. M. Myers.

GENERAL HOSPITAL, SANTIAGO CUBA (FROM THE HELIOGRAPH TOWER.)

Hospitals abandoned.—In consequence, I believe, of exorbitant claims made for rental, orders were issued by the department commander on September 12 to evacuate at once the *Reina de los Angeles* and the Nautical Club, and to complete this evacuation in one day; the patients were accordingly bustled out with as much celerity as though they had been picked up on the battlefield, and transferred to the general hospital and officers' hospital; fortunately, there were few acute cases liable to be injured by such unnecessarily hurried transportation.

* * * * * * *

From the time we entered the general hospital commenced the active work of renovation and modernization, and this never ceased until the day when yellow fever compelled our evacuation. Bathrooms, water-closets, etc., were attached to each ward, pipes and sewers laid, old underground drains, clogged with filth, opened, torn up, and filled in; an operating room, almost perfect in its equipment, was fitted out, as well as a bacteriological laboratory, while a body of painters and kalsominers made every surface, inside and out, clean, neat, and pretty. This work, well begun by Surg. S. Q. Robinson, was vigorously pursued by Surg. L. C. Carr and later by his successor, Surg. P. Clendenin, who died of yellow fever in July, the victim of his zeal and love of duty.

Other hospitals have likewise been repaired and improved, at the cost of much labor and money, especially those at Holguin, Manzanillo, Guantanamo, and San Luis.

The insanitary conditions in and around the city of Santiago at this time may be understood from the following extract from the report of Brig. Gen. Leonard Wood, United States Volunteers, commanding the department:

> During the period between August 10, the date of formation of the department, and August 25, the date of sailing of the last of the Fifth Army Corps, the conditions existing in and about the City of Santiago were serious in the extreme. The prostrating effects of the siege were showing themselves plainly on the population, who were dying at the rate of 180 per day. The city was full of sick people, there being hardly a house which did not contain one or more persons suffering from disease. There was a large number of the Fifth Army Corps sick, and field hospitals practically surrounded the city. The water main, which had been partially destroyed during the siege, had not been placed in complete repair, and there was a great shortage of water. In addition to our own troops and civilians, there were some 12,000 Spanish prisoners, who had nearly 4,000 sick. All these conditions rendered the service of the new troops extremely arduous, and the difficulties of supplying and taking care of them became very great.

The work of sanitation in the city of Santiago, and generally throughout the province, was carried on with system and thoroughness, under the direction of the department commander. The result was a very great decrease in the death rate and a marked improvement in the public health. An epidemic of smallpox in the Holguin district was suppressed (see page 245), and the hope was entertained that these sanitary improvements would be followed by a diminished prevalence of yellow fever during the season of 1899.

Meanwhile the Volunteer regiments were withdrawn, their stations being taken by the Fifth Infantry and the Tenth Cavalry, Regulars. In June, 1899, yellow fever made its appearance in the infantry barracks. The troops were immediately removed from the infected buildings. Two companies went into camp about 2 miles from the city, while the others encamped on the parade ground, as at the time there seem to have been special reasons for keeping as many troops as possible in or near the city. No other case occurred among the men who were sent away, but among those retained near the barracks cases continued to appear day after day until June 30, when the companies were removed to a distance of several miles. (See page 251 for a report of this epidemic.)

The troops which occupied the province of Puerto Principe were the headquarters of the Second Brigade, Third Division, Second Army Corps, with part of the Eighth United States Cavalry. These were shortly afterwards reinforced by the remainder of this regiment, the Fifteenth Infantry and the Third Georgia Infantry. All landed at Nuevitas, two companies of the Fifteenth Infantry remaining as a garrison at the landing place. Four companies of this regiment occupied Ciego de Avila; the Third Georgia Regiment took station at Minas, while the remainder of the command marched inland 45 miles to Puerto Principe, where they went into camp about 3 miles northeast of the town. The Georgia regiment was returned to the United States for muster out March 24, 1899.

The camp sites selected were satisfactory, as the grounds had good slope for drainage and were near small streams, except in the case of Nuevitas. The men were quartered in hospital tents, which were floored and furnished with comfortable cots. The infantry camp near Puerto Principe was situated about 600 yards from the Hatibonica River, from which or from a tributary creek water was hauled in wagons. This water before being used as a drinking supply was boiled and filtered, a Pasteur-Chamberland filter having been issued to each of the companies for this purpose. At Nuevitas rain water had to be depended upon as the sole source of supply. The dry earth system in wooden boxes was used for excreta, a corps of Cuban scavengers attending to the work of removing, cleaning, and returning the boxes; but as the men of the command did not make an efficient use of the dry earth provided for them, foul odors arose from the uncovered excreta, and flies swarmed in the neighborhood. Garbage pits were not permitted to be dug in the camp, all refuse of this character being wagoned to a dumping ground at a distance. The cavalry regiment was at first camped on the river near the infantry command, but in April it moved to fresh ground, distant about a mile and a half south.

All sanitary precautions were taken in this camp. Instead of wooden boxes galvanized iron receptacles with tight covers were used in the latrines, and the supply of carbolic acid and dry earth was liberal and freely used by the men. Tin urinals containing carbolic acid were placed in the company streets for use at night. Shortly after these camps were established the advisability of providing better shelter for the troops led the chief surgeon, Maj. S. T. Armstrong, United States Volunteers, to consider the best means of accomplishing this. He found available for the use of the commands at Puerto Principe two spacious brick buildings, formerly used as barracks by the Spaniards, and a third which he considered suitable for hospital uses. A plan of disinfection and renovation was submitted, which provided that the ceilings and walls of these buildings should be brushed down and sprayed with a 5 per cent carbolic solution or a 1 to 500 mercuric solution; that all wooden floors and old woodwork should be removed, the subfloor spaces cleaned out, and the joists and floors sprayed with carbolic solution and then whitewashed. This was approved and carried into effect. The ceilings or inner surfaces of the roofs were lime washed, varnished, or painted, doors and windows were painted and new wooden floors were laid. The privies were cleaned out, disinfected with mercuric chloride, recemented, and so arranged that they could be emptied by a pneumatic excavator. But these renovations progressed so slowly that the hospital was not ready for use until April 11, nor the cavalry and infantry barracks until the middle of May. Meanwhile the system of regimental or local hospitals had to be utilized, and each regiment and detachment was properly equipped to meet the ordinary exigencies of camp life under the conditions expected to prevail.

OPERATING ROOM, GENERAL HOSPITAL, SANTIAGO CUBA

The infection of measles was present in the Fifteenth Infantry and Third Georgia regiments, but the chief points of interest in the medical history of this command center in an outbreak of typhoid fever and in the occurrence of many scattered cases of yellow fever.

Typhoid fever was brought from the United States by both of the regiments camped near Puerto Principe. Fevers recorded as remittent malarial or left on the record without diagnosis were of frequent occurrence during the months of January and February, and many of these were of prolonged duration, notwithstanding the free use of quinine. Deaths occurred and the pathognomonic lesions of typhoid were discovered on the post-mortem examination of these cases, but it was not until March 12 that the medical officers on duty with these commands recognized that a typhoid fever epidemic had been permitted to have full headway in their camps. In consequence of their failure to appreciate the true nature of the situation, the regimental hospitals became crowded with patients for whose treatment no adequate provisions had been made, and the infection may be said to have pervaded every tent of the lines of company quarters. On the recognition of the disease every effort was made to suppress it, and these efforts are reported to have been successful, but a careful study of all the records leads to the belief that the disease died out, because in the affected regiments there were no more men who were susceptible to its influence.

Immediately on learning of this typhoid outbreak I sent Maj. Walter Reed, surgeon, United States Army, to investigate for my information and to give the benefit of his experience to the local officers. His report is given on page 275.

A summary of the cases of yellow fever which occurred in this department from the date of the American occupation to Oct. 51, 1899, is presented on page 255, of this report.

On July 1, 1899, the departments of Santiago and Puerto Principe were consolidated.

THE DEPARTMENT OF PORTO RICO.

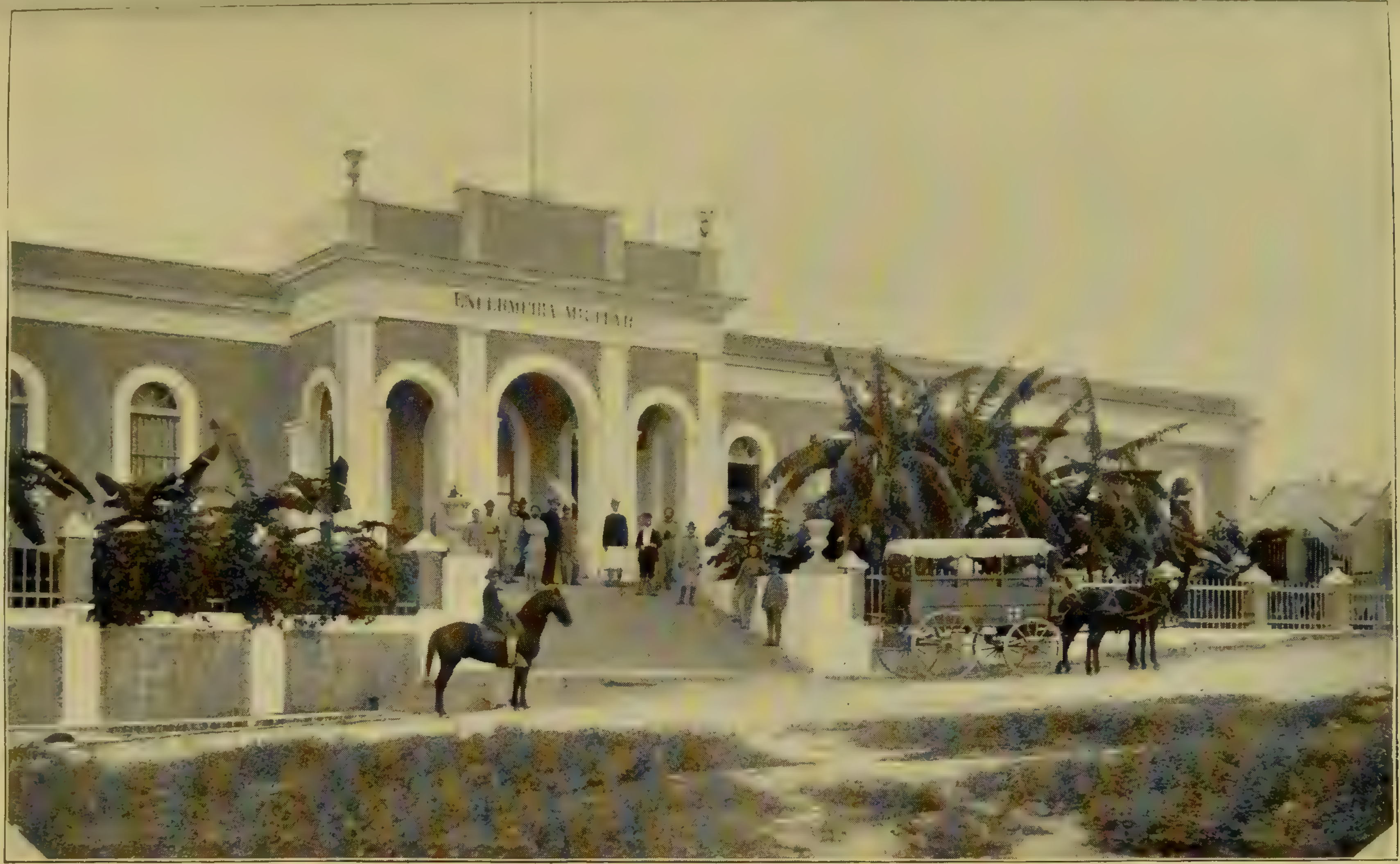
The invasion of Porto Rico was effected July 25, 1898, by Maj. Gen. Nelson A. Miles, at Guanica, on the southern coast, with the brigades of Generals Schwan and Garretson constituting a provisional division under the command of General Henry. A few days later these were reinforced by the brigades of Generals Ernst and Haines, First Division, First Army Corps, General Wilson, division commander, and General Brooke, corps commander, accompanying. The military department of Porto Rico was organized October 18, 1898, with the last-named officer in command, headquarters at San Juan, and Lieut. Col. J. Van R. Hoff, United States Volunteers, chief surgeon. The department was divided into two districts—the district of San Juan, Brig. Gen. F. D. Grant, United States Volunteers, commanding, and the district of Ponce, Brig. Gen. Guy V. Henry, United States Army, commanding. The troops were stationed as garrisons at various posts throughout the island, but so rapid was the homeward movement after the capitulation that, although on August 31, 1898, there was present a force of about 17,000 men, on November 30, it was reduced to barely 8,000, while the mean strength for the first six months of 1899 was only 4,322. These troops were scattered in small bodies at a number of stations, usually in the neighborhood of the cities. At some of these they are quartered in barracks formerly occupied by the Spaniards. At others, buildings more or less suitable have been rented for their shelter. At those which are expected to be occupied for some time improvements are in progress. Water supplies have been improved, and water-closets, baths, and sewers have been planned or constructed. Five military hospitals, turned over to us by the Spaniards, are in use at San Juan, Ponce, Mayaguez, Cayey, and Aibonito, respectively. Temporary arrangements for hospital accommodations have been made at other stations. All are amply provided with the means for caring for the sick.

The hospital at San Juan was built as a civil hospital in 1774 by Bishop Manuel Jiminez Perez. When the war with Great Britain broke out, four years later, the hospital was turned over to the Government for military purposes. When General Brooke took possession of the island last year on behalf of the United States he was officially informed that the terms of cession of the hospital to the military from the church authorities provided that thirty indigent civilians should always be treated in it free of cost. According to Chief Surgeon Hoff, however, this claim should now be considered canceled, inasmuch as a building formerly used as a riding school has been converted to hospital uses at the expense of the United States and turned over to the city.

The military hospital at San Juan is well situated on one of the highest points of the city, but it is cut off from the sea breeze by a large infantry barracks on one side, and it has the unsanitary habitations of a low class of the population on another side. It is a massive 2-storied rubble structure of brick, stone, and mortar, with a frontage of 264 feet, and a depth of 163 feet. The rooms in both stories are about 17 feet in height. The roof is flat with a 3-foot wall, and is tiled, to collect the rain fall which is carried to cisterns underlying the central patio, or courtyard. Water from these is pumped up by hand to distributing tanks. At present, however, water is delivered throughout the building from the city mains, its source being the Rio Piedras.

When the hospital was turned over to us it was exceedingly dirty, but the work of cleaning, repair, and alteration was immediately begun and has been progressing slowly since that time. An outfit for a 400-bed hospital was sent from the United States to provide a satisfactory equipment. It has six wards containing 190 beds, each of which has a floor space of 92 feet and an air space of 1,717 feet. It has also an isolation ward of 20 beds. The general sanitary condition is now very good. The plumbing fixtures are excellent in character. When the work in progress is completed it is considered that this hospital will compare favorably with the best military hospitals in the United States. A refrigerating plant, with a daily output of three tons of ice, is being installed. A steam laundry, disinfector, and dynamo are desired by the surgeon in command and the chief surgeon of the department. The excellent condition of this hospital is due to the energy and earnest efforts of Maj. Charles F. Mason, surgeon, United States Volunteers, and Capt. F. P. Reynolds, assistant surgeon, United States Army. The present commanding officer is Lieut. Bailey K. Ashford, assistant surgeon, United States Army. The status of a general hospital was given to this establishment March 2, 1899, and it is now the only general hospital in the island.

The hospital at Ponce was occupied and designated a general hospital at the time of the invasion. Maj. H. P. Birmingham, surgeon, United States Volunteers, was placed in command. Its capacity was 100 beds, but at that time it often contained as many as 250 patients.



POST HOSPITAL PONCE, P. R

Connected with it was a convalescent camp of floored, framed, and raftered hospital tents, with accommodations for 500 patients, and supplied abundantly with the field appliances and medical stores of the supply table. On June 14, 1899, this establishment ceased to exist as a general hospital and became the post hospital of the Ponce garrison. It is now in excellent condition, modern plumbing and permanent fixures having been introduced.

A most important sanitary work was undertaken and carried to a successful conclusion by the chief surgeon of this department. This was the suppression of smallpox in the island by means of a general vaccination of the population. A detailed report of the work has not as yet been received, but the general outlines are given on page 246 and in the following report of the chief surgeon for the past year:

HEADQUARTERS DEPARTMENT OF PORTO RICO,
CHIEF SURGEON'S OFFICE,
San Juan, P. R., July 24, 1899.

GENERAL: I have the honor to submit the following report on the work of the Medical Department in Porto Rico during the year of occupation ending this day. For details covering August and September, 1898, which may be called the period of invasion, you are respectfully referred to the reports of Col. Charles R. Greeneaf. Assistant Surgeon-General, United States Army, and Lieut. Col. Rush S. Huidekoper, chief surgeon, United States Volunteers,[1] who were chief surgeons in Porto Rico at that time.

In order to gain a satisfactory understanding of the sanitary conditions and he results therefrom obtaining in this department, a brief review of its geography, topography, and meteorology, is necessary together with an account of the movement of troops from time to time constituting its garrison.

The Department of Porto Rico consists of the islands of Porto Rico, Vieques, Culebra, and numerous adjacent islets, many of which are uninhabited. These are n latitude 17° 54′ to 18° 30′ north, and longitude 61° 54′ to 63° 32′ west of Madrid, and are diversified in surface and soil. The island of Porto Rico, by far the most mportant of the group, is rectangular in shape. Its northern coast throughout ts entire hundred miles follows closely the latitudinal line 18° 28′ north, with but one real harbor—that of San Juan. The eastern coast is rugged, with many inlets dotting its front, which furnish fair anchorage grounds. The southern coast, washed by the Caribbean Sea, has numerous indentations, roadsteads where ships may safely anchor under ordinary circumstances, but with the exception of Guanca, and possibly Jobos, there are no real harbors. The western coast looks out on he Mono Channel, and it, too, is irregular and indented, but without landlocked harbors.

Porto Rico is approximately 95 miles from east to west and 35 from north to outh: its area is 3,668 square miles and its population 1,000,000. A central chain of hills. running from east to west, divides the island into two main watersheds, and sends spurs in various directions, some of which terminate at the coast line. Several prominent peaks reach an elevation above 3,000 feet, and one, Junque (The Anvil), is 5,000 feet high. Numerous streams, rise in these mountains, and, swollen by frequent rains, find their way to the ocean by leaps and bounds. Vieques, the second island of this group in size, is situated about 15 miles to the eastward of Porto Rico. It is 21 miles long by about 6 miles wide, and contains one town Isabela II), where there is a military post. The population is about 10,000.

But two seasons are recognized here, the dry and the rainy, though this is largely a figure of speech, since there is an almost daily shower. The minimum temperature (Fahrenheit) in January was, a. m., 72°; m., 82°; p. m., 78°. The maximum emperature in August was, a. m., 86°; m., 92°; p. m., 90°. "The rainy season culminates in September. when the rain comes down like an immense quantity of water passed through a sieve, excludes from view every surrounding object, and n half an hour the whole surface of the earth becomes an immense sheet of water."

The predisposition to sickness excited by the heat of the summer months is precipitated by the rains of September, and the unacclimated fall victims to the tropcal fevers, whose name is legion, and whose etiology is a terra incognita. In October the rains begin to abate and with the approach of Thanksgiving Day the lovely "winter" season dawns upon us. I regret that accurate vital and morbidity statistics are not available. The civil administration of the Spanish in this respect seems to have consisted chiefly in making rules which they did not enforce, and until the superior board of health, now organizing, can collect and publish such statistics, we must fall back upon the records of the Medical Department for any conclusions we may desire to draw from our morbidity experiences in this part of the tropics.

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[1] See pp. 146–147 and 171–172 of the Report of the Surgeon-General of the Army for the fiscal year ended June 30, 1898.

The United States forces, under command of Maj. Gen. Nelson A. Miles, reached Guanica, on the southern coast of Porto Rico, July 24, 1898, and on the following day made a landing at that point. The first troops to land were known as the Provisional Division, under the command of Brig. Gen. Guy V. Henry, United States Volunteers (afterwards major-general, United States Volunteers), and came from Santiago de Cuba, where they had gone to reenforce the Fifth Army Corps, but did not land there. The division consisted of two brigades, as follows:

First Brigade.—Brigadier-General Schwan, United States Volunteers; Eleventh United States Infantry; Nineteenth United States Infantry; battalion of engineers (34 men United States Engineer Battalion; Company H, District of Columbia Infantry Volunteers; detachment Illinois Infantry); Troop A, Fifth United States Cavalry; Battery H, Fifth United States Artillery; one company Signal Corps, United States Volunteers.

Second Brigade.—Brigadier-General Garretson, United States Volunteers; Sixth United States Infantry Volunteers; Sixth Massachusetts Infantry.

The division also had its complement of field hospitals and ambulance companies.

On July 27 the First Brigade, First Division, First Corps, under Major-General Wilson and the immediate command of Brigadier-General Ernst, arrived at Ponce. This brigade consisted of the Sixteenth Pennsylvania Infantry; Second Wisconsin Infantry; Third Wisconsin Infantry; Troop C, New York Cavalry; Battery F, Third United States Artillery; Battery B, Fourth United States Artillery, together with its brigade hospital and ambulance detachments.

On July 31 the Second brigade, First division, First Corps, reached Arroyo, under command of Major-General Brooke, United States Army, and the immediate command of Brigadier-General Haines, United States Volunteers. It consisted of the Third Illinois Infantry; Fourth Ohio Infantry; Fourth Pennsylvania Infantry; Troop H, Sixth United States Cavalry; Philadelphia City Troop; Light Battery B, Pennsylvania Volunteers; Twenty-seventh Light Battery, Indiana Volunteers; Light Battery A, Missouri Volunteers; Light Battery A, Illinois Volunteers; Company F, Eighth United States Infantry; four companies Signal Corps, United States Volunteers.

The hospital and ambulance detachments of this brigade were reenforced by the reserve hospital and ambulance company of the First Army Corps.

The total strength in Porto Rico August 31, 1898, as reported by the Adjutant-General, was 16,973. Subsequently the First United States Engineer Volunteers, First Kentucky Infantry, Sixth United States Infantry Volunteers, Forty-seventh New York Infantry, Fifth United States Cavalry, and Light Batteries C and M, Seventh United States Artillery, and Battery E, Fifth United States Artillery, served in this department.

As previously stated, Col. Charles R. Greenleaf, Assistant Surgeon-General, United States Army, on the staff of the Major-General Commanding the Army, was the first chief surgeon in Porto Rico, and remained during the period of active operations. Upon his departure Lieut. Col. Rush S. Huidekoper, United States Volunteers, chief surgeon First Army Corps, became the senior medical officer on the island.

On October 18, 1898, the day our flag was raised over San Juan, the Department of Porto Rico was organized under command of Major-General Brooke, and department headquarters were established here. I was assigned as chief surgeon by telegraphic orders from the War Department dated September 25, 1898, and reported for duty October 25, 1898. During the interval between the departure of Colonel Huidekoper and my arrival, Maj. Louis Brechemin, surgeon, United States Army, was on duty as chief surgeon of the department. I found the chief surgeon's office without form and void; not a record, nor a book in which to keep it; not a clerk; nothing, indeed, which would furnish any information as to the existing organization of the medical department, or the number, names, and location of its personnel. The then military organization may be outlined as follows: As heretofore stated, Porto Rico is traversed by a chain of mountains running from east to west, dividing the island into two natural geographical divisions, which were known officially as the District of Ponce, under the command of Brig. Gen. Guy V. Henry, United States Army, and the District of San Juan, under the command of Brig. Gen. F. D. Grant, United States Volunteers, with posts as follows:

District of San Juan.—Arecibo, Barcelonita, Bayamon, Camuy, Carolina, Ciales, Dorado, Fajardo, Humacao, Manati, Rio Piedras, San Juan, Santurce, Toa Alta, Utuado, Vieques.

District of Ponce.—Aguadilla, Aibonito, Adjuntas, Cayey, Coamo, Caguas, Guanica, Guayama, Isabela, Lares, Las Marias, Mayaguez, Ponce, San German, Yauco.

In the city of San Juan troops were stationed at the Morro, Fort San Cristobal, and Ballaja Barracks. In Ponce they were at the Quartel, in various rented buildings scattered throughout the city, and at the Playa. The command at that time consisted of the following organizations, viz: Eleventh United States Infantry; Nineteenth United States Infantry; Troop A, Fifth United States Cavalry; Light Battery C, Third United States Artillery; Light Battery D, Fifth United States Artillery; Light Battery B, Fourth United States Artillery; Third Illinois Infantry; Fourth Ohio Infantry; Troop H, Sixth United States Cavalry; Company F, Eighth United States Infantry; First United States Engineer Volunteers; First Kentucky Infantry; Sixth United States Infantry Volunteers; Forty-seventh New York Infantry; Batteries B and G, Fifth United States Artillery; Light Batteries C and M, Seventh United States Artillery, with five companies of the Signal Corps, a provisional ambulance company at Ponce, and detachments of the hospital corps scattered throughout the island, the whole numbering 9,636 officers and men. On October 29 the Fourth Ohio Infantry departed, followed in November by the batteries of the Third and Fourth and Light Battery D of the Fifth United States Artillery, with Company F, Eighth United States Infantry, and Troop H of the Sixth United States Cavalry, the Third Illinois Infantry, and the First United States Engineer Volunteers, leaving the strength of the command November 30, 1898, 7,774 officers and men. December 5 the First Kentucky Infantry departed, but during the month there was no further loss, except by individual casualty. The number of troops remaining December 31, 1898, was 6,491.

This formative period was one of constant change and the work entailed upon the administrative officers was unceasing. Nothing was, everything had to be.

On December 6 General Guy V. Henry assumed command of the department and next day the following order was issued:

General Orders, } HEADQUARTERS DEPARTMENT OF PORTO RICO,
No. 25. } *San Juan, December 7, 1898.*

The following are announced as main posts in this department:

IN THE DISTRICT OF SAN JUAN.

Post of San Juan.—Subposts: Carolina, Fajardo, Humacao, Rio Piedras, Santurce.

Post of Caguas.—Subposts: Cayey, Guayama, Aibonito.

Post of Arecibo.—Subposts: Barcelonita, Bayamon, Camuy, Ciales, Dorado, Toa Alta, Utuado, Manati.

Post of Vieques.—No subposts.

IN THE DISTRICT OF PONCE.

Post of Ponce.—Subposts: Yauco, Guanica, Adjuntas, Coamo.

Post of Mayaguez.—Subposts: Aguadilla, Las Marias, San German, Isabela, Lares.

Post commanders will have general charge of the subposts and the country in their jurisdiction, and will make frequent personal inspections to see that everything is in order and that all returns and reports from subposts are promptly made.

Detached posts will report to the main post from which they are detached. Subpost commanders will forward promptly to main-post commanders all reports and returns and draw their supplies from their main posts unless otherwise ordered, and, with the main-post commanders, will use the utmost vigilance to arrest criminals and preserve order.[1]

In case of necessity direct correspondence or report may be made by subpost commanders to district headquarters, in which case the main-post commander will be immediately notified.

By command of Brigadier-General Henry:

W. V. RICHARDS,
Assistant Adjutant-General.

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[1] Reports pertaining to the medical department were forwarded direct from subposts and were not consolidated with those at the main posts.

Including the subposts of San Juan and Ponce heretofore mentioned and the general hospitals, at this date troops were stationed at 39 posts.

The three general officers stationed in Porto Rico had fully organized staffs, including a chief surgeon. Indeed, the term "chief surgeon" was so generally misapplied that it carried no significance and only served to still more confuse the crude material with which we had to work.

The commander of the district of Ponce, who during the period that the department commander was engaged on the Porto Rican commission was in charge of the military forces of the island, including, apparently, the general hospital at Ponce, relinquished general control when the department commander reassumed command.

To make it quite clear that the normal peace conditions were to be reestablished at the earliest practicable moment, so far at least as the medical department was concerned, the following order was issued:

General Orders, No. 6. | HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, November 1, 1898.

The administrative work of the medical department will be done at these headquarters, and the work of the medical officers now on duty at the district headquarters will be confined to medical inspections of their respective commands and the instruction of the medical officers serving therein, in the keeping of records, making requisitions, rendering reports, etc., strictly in accordance with regulations. Reports covering these inspections and other matters relating to the medical department will be forwarded through the district commanders to these headquarters.

By command of Major-General Brooke:

W. V. RICHARDS,
Assistant Adjutant-General.

But it was some time before either the letter or the spirit of the foregoing order was observed, and the embarrassments which this office labored under were thereby greatly increased.

The following telegram, placing the general hospitals in Porto Rico under the immediate control of the chief surgeon of the department, facilitated administration and made clear his relation to these organizations:

WASHINGTON, D. C., *November 9, 1898.*

COMMANDING GENERAL,
Ponce, P. R. (forwarded):

Secretary War directs general hospitals in Porto Rico will be under direction chief surgeon department and under orders commanding general.

CARTER.

It may be said that so far as possible the Surgeon-General had transferred his functions and responsibilities to the chief surgeon on the ground, and, I trust, without detriment to the service.

The Department of Porto Rico has five permanent military hospitals, which were erected by the Spaniards and inherited by us. These are located at Ponce, Mayaguez, San Juan, Cayey, and Aibonito. The first two were taken possession of almost immediately upon our arrival and the others when the capital was evacuated by the enemy, October 18, 1898.

The hospital at Ponce was at once taken possession of, placed under command of Maj. H. P. Birmingham, surgeon, United States Volunteers (assistant surgeon, United States Army), and designated a general hospital. Its capacity was 100 beds, but it often contained 250 patients. In connection with this hospital was a convalescent camp of floored and raftered hospital tents, the occupancy of which reached 500 patients, so that it will be seen that the patients plus the personnel of this establishment considerably exceeded 1,000 persons.

My first inspection of this hospital was made in November, two months after its establishment, when I found it a very comfortable and well-conducted field hospital, part of it located in a permanent building, but all furnished with the field appliances of the medical department and nothing more. The sanitary arrangements were Spanish, which may be construed to mean that they were everything unsanitary. At the time of my inspection modern water-closets were being introduced, but, according to Porto Rican fashion, the fixtures were placed over a large cesspool, to the bottom of which the solid excreta were precipitated, while the liquid, when it reached a proper level, was conducted by pipe into a neighboring ravine, though a connection was finally made with a sewer which emptied into another ravine farther away. This installation had soon to be torn out, and the question of payment is still sub judice, Mr. Graham, of Ponce, being the claimant. In my opinion, the creditor is entitled to payment for the work he did and the material furnished, at a fair valuation. The work was done under stress of immediate necessity and, so far as I know, without plan or specification, proper authority, or supervision, and was probably the best the man knew how to do. The result, bad as it was, should be considered as having met the necessities of the occasion, and its cost should be charged to the emergency account, with many other things that were not half as useful.

Due to the kindness of some Philadelphians and the work of the First United States Engineer Volunteers, a refrigerating plant was purchased for this hospital and installed in a building located on hired land. In fact, save the land on which the hospital building stands (and even this is said to have been squatted on), there are no hospital grounds, and the ice plant, convalescent camp, coal shed, and reservoir are all on land the rental of which makes a heavy charge against the hospital. The refrigerating plant is used chiefly for cold storage, and produces only about 250 pounds of ice daily. This was very well for a hospital of 1,000 beds and two shiploads of ice in the harbor, but is a great waste of power under present conditions. The reservoir was constructed to furnish head to flush the fixtures and supply the convalescent camp, located just below it, on the hill. Every gallon of water must be pumped into it. To be sure, the same machinery that makes the ice pumps the water, but even with this the cost is excessive. I have recommended a windmill and tank as a substitute for the pumping engine and reservoir, and the purchase instead of the manufacture of ice.

With the return of normal conditions the work of placing this hospital, together with the other permanent hospitals in this department, upon the highest plane of efficiency has been pushed. Modern plumbing and permanent furniture have been introduced and the organization crystallized under the excellent management of Capt. George M. Wells, assistant surgeon, United States Army, who assumed command of the hospital December 21, 1898. Standing wash basins in the lavatories, proper cases and appointments for the dispensary, modern furniture for the operating room, and an adequate professional library, represent the small requirements of this hospital, which are now being met. Among the larger ones are quarters for officers and hospital stewards, without which all the hospitals in the department are handicapped. I recommend the purchase of a large vacant lot opposite the hospital at Ponce, where ample space will be afforded for the necessary buildings. June 14, 1899 (on my recommendation), by order of the Secretary of War, the general hospital at Ponce ceased to exist and that establishment became a part of the post of Ponce.

The hospital of Mayaguez, upon the capture of that city by General Schwan, became the first brigade hospital of the provisional division. The building was erected in 1896, and a description of it has already been given in a report of a medical inspection by the writer. It is being repaired, replumbed, reequipped, and refurnished, and only needs medical officers and stewards' quarters to complete it. It has the same objection that attaches to all military buildings in Porto Rico, the grounds about it being inadequate. A considerable accumulation of field medical supplies accrued at this hospital during the war, which material is gradually being disposed of. The building has comfortable accommodations for 50 patients.

The hospital at San Juan was created a general hospital by paragraph 1, General Orders, No. 34, Headquarters of the Army, Adjutant-General's Office, March 2, 1899, and is now the only general hospital in this department. The alterations and repairs necessary to modernize this building are slowly being accomplished. Standard furniture and appliances have been provided in ample amount by the Medical Department, and when the workmen will have finally left the building it is believed that this hospital will be in every way up to the standard of such institutions at home. The same remark made regarding the other permanent hospitals holds as to this, there being no quarters for officers or hospital stewards conveniently located and available.

Permanent quarters in Casa Blanca (immediately contiguous to the hospital, and now occupied by other officers) should be assigned to the commanding officer of the hospital, who should always be where his work is, and one officer should be required to quarter in the hospital as resident physician, though this is contrary to paragraph 1430, Army Regulations. The chief surgeon wishes to express his appreciation of the excellent work done by Capts. Charles F. Mason and F. P. Reynolds, assistant surgeons, United States Army, in organizing and conducting this hospital.

The general hospital at San Juan can comfortably accommodate 200 patients, and under stress 200 more.

Its present needs were set forth in a letter heretofore submitted. The refrigerating plant which was contracted for March 25, 1899, has arrived, and is now being installed. It will have a capacity of 3 tons daily, and will prove an acceptable addition. In connection with this there should be a steam laundry and disinfector, as well as a dynamo. The saving in cost of laundry work at the general hospital would pay for the machine in one year. The boiler power of the ice machine would be sufficient for all the other machinery.

Two small hospitals are located on the military road, one at Cayey and the other at Aibonito. The posts at these places, where there are permanent barracks for one company, are said to have been built for health stations, and were not yet completed at the time of the surrender of the island. The hospitals, constructed on the same plan, are 100 feet long by 20 feet wide; have at one end a kitchen, etc., and at the other end dispensary, storeroom, etc., most of the space being given up to the ward, the capacity of which is 30 beds. The interior of the hospital at Aibonito has been rearranged and made much more comfortable; plans and specifications for a more extensive alteration of that at Cayey are being considered, the estimated cost of which is $7,000.

At all the other military posts there are temporary hospitals established in hired quarters. Most of these are dwelling houses, which are more or less suitable for the work, but which, of course, are not comparable with regularly constructed hospitals. The rental in every case is a fair percentage of the cost of constructing proper buildings, and were it known where troops are to be permanently stationed it would be very much in the interest of efficiency, and equally economical, to build proper hospitals.

At San Juan, Ponce, Mayaguez, San German, Aguadilla, Las Marias, Adjuntas, Aibonito, Cayey, Humacao, and Vieques are permanent barracks. The ownership of these and their continued occupancy, as heretofore stated, are in doubt, but it may be safely assumed that troops will always be maintained at at least four of these stations—San Juan, Ponce, Mayaguez, and Humacao, with probable substations at Cayey, Aibonito, San German, Aguadilla, and Vieques, six of which are without proper hospital accommodations. It is immediately desirable that a proper hospital should be constructed at Humacao, where if the Government owns anything it is simply a barrack building in the midst of a block of houses. It is believed that a second story could be added to the barrack building at a reasonable cost, and would furnish better hospital accommodations than are now obtainable; and this plan would be equally applicable to all of the above-named posts at which there are no hospitals. A secondary advantage would be that we are thereby improving our own property. Of course, this is not ideal, but probably as good a plan as existing conditions will permit.

The question of what will be the military policy of our Government towards this island is interesting to consider, for upon it will depend numerous sanitary questions relating to the troops.

Presumably the permanent garrison will not exceed two batteries of artillery, a regiment, mounted or foot, and a battalion of native troops, with staff troops, etc., making a total strength of about 2,000. If we are to follow home customs, these troops will ultimately be located at posts near strategic points, but in open country with ample space for military purposes. No post is so located now; indeed, the barracks are all in the midst of towns, and some closely surrounded by a dense and unhealthy population. If the assumed change is to be made, and I believe sooner or later it must be, it is not desirable to expend any more on present structures than barely enough to make them habitable from our standpoint. I trust we will not be actuated by a penny-wise pound-foolish policy of trying to make what we have now do for the future. We need not the experience of Great Britain in the West Indies to teach us that healthy habitations are a *sine que non* to healthy living in the Tropics, and I hope it will never be said of our possessions here that they are the graveyards of United States soldiers. To avoid this possibility it would be well to move away from touch with a population which is physically degenerate. We can not, however, hope that this will be done to-morrow or even next year, so it behooves us to set such houses as we may have in order against the wrath to come, not forgetting that suitable hospital accommodations are part of the scheme.

The necessity for an infectious-disease hospital in San Juan for the exclusive use of this command must be apparent to all.

On November 4, 1898, I addressed the following letter to the adjutant-general, Department of Porto Rico:

"SIR: I have the honor to recommend that steps be taken to vacate the pest hospital at the earliest practicable moment. This hospital is now occupied by some of the Eleventh Infantry, and no other suitable provision can be made for any infected case."

POST HOSPITAL MAYAGUEZ, P. R.

The so-called "pest hospital" is known as the yellow fever hospital, and was built by the recent government for the treatment of those ill of that disease. It was the outcome of their experience in 1895, when their soldiers sickened by the hundred and died by the score, and of their experience of every year before that of which we can find record, in which is invariably noted the title "yellow fever." These buildings were not completed at the time of the evacuation, and owing to the partial destruction of the Ballaja barracks by Sampson's fleet were occupied as barracks, and continue to be so occupied. I have repeatedly asked for this or another infectious-disease hospital, have submitted plans and specifications for the construction of such a building, and have used every effort to show the necessity for it, but as yet no such hospital exists. At the same time I recognize the fact that our soldiers must neither be overcrowded nor forced to live in tents, leaving buildings unoccupied awaiting the arrival of patients not yet in esse: so when these patients come they will go into tents until proper barrack provisions can be made for our soldiers.

Working medical libraries containing a few books have been established at all posts, and a circulating medical-journal library was inaugurated shortly after my arrival here: as a consequence the surgeons have been enabled to keep themselves informed in current medical literature. Standard libraries should be placed in the chief surgeon's office and in the hospitals at San Juan, Ponce, and Mayaguez. These libraries should be on the same plane with those at our large home hospitals, and kept supplied with the best recent publications.

Thanks to kind friends at home, excellent secular libraries have been sent to the hospitals at San Juan, Ponce, and Mayaguez. A large number of periodicals have been supplied to the smaller posts, which were contributed from the same sources and distributed from the medical supply depot.

What constituted the personnel of the medical department here during the period of actual operations will probably never be known: it took many weeks of earnest inquiry after my arrival here before an approximately correct list could be obtained, and there is more than a reasonable doubt that so long at least as the volunteers remained on the island a complete list was never obtained. The following table gives the official status on December 31, 1898:

	Medical officers, Regulars.		Medical officers, Volunteers.		Contract surgeons.		Hospital stewards.		Acting hospital stewards.	
	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.
Administration	3				1		1		3	
General hospital, San Juan	1	2			10	2	4		10	1
General hospital, Ponce	1	1			9			1	4	2
Hospital, Mayaguez	2				1		3		5	
Hospital, Arecibo			1	2	1					
Hospital, Caguas			1		1		1			
Thirty sub. posts			2		28	1	2		10	
Unattached				1		1				
Total	7	3	4	3	51	4	11	1	32	3

	Privates, hospital corps.		Contract nurses, male.		Contrast nurses, female.		Civilian laborers.		Hospital matrons.	
	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.
Administration	1									
General hospital, San Juan	141	6	2		17	10				
General hospital, Ponce	52	3	4		22					
Hospital, Mayaguez	22								3	
Hospital, Arecibo	7		1		6				4	
Hospital, Caguas	2									
Thirty sub. posts	49	2	7		2				3	
Unattached	18									
Total	292	11	14		47	10			10	

The regular medical officers during the period of active operations were few. The volunteer regimental surgeons were distributed among the various regiments and divisional organizations, and the large chinks were filled by contract surgeons, some of whom were admirable men and others were not. With the two brigades of the First Division, First Corps, were the reserve hospital and ambulance company of that corps, which gave them a hospital strength equivalent to that of nearly two divisions. The writer had occasion to know what this meant to those who had to take care of the sick of the First Division of that corps left at Chickamauga, without officer or man to look after them, except those who could be spared with difficulty by the Third Corps, but doubtless the compensation was found here.

The wave of pity which overflowed our country, mingled with patriotism, curiosity, and perhaps other motives, brought great throngs of people to the assistance of the Medical Department, and the personnel never lacked in numbers, but it certainly did in discipline, training, and almost every thing else that pertained to an effective organization. It would seem that the same idea obtained regarding the sanitary soldier as regarding the medical officer, viz. that he could be improvised without the slightest difficulty. Congress made no provision for such an organization as a hospital corps for the Volunteer Army. because presumably it held that every soldier should and would take care of the sick and wounded. On no other ground can lack of action in this direction be accounted for, and moreover that this conclusion is legitimate, is shown by the fact that three hospital stewards were allowed to each regiment, but not even one private of the Hospital Corps. It was because of this that the Medical Department was forced by transferring unwilling "volunteers" to the Hospital Corps of the regular establishment, to accept an organization which in its very nature could not fail to be inefficient. But not only was it deficient in quality, but it was inadequate in numbers. We suffered during the last war from inability to multiply. Nobody questioned that a two-company post needed a steward and four privates of the Hospital Corps. and everybody knows that the average strength of such a post was about 100. It seems a simple problem to solve. If 100 men require 5 men of the Hospital Corps, 100.000 would require 5,000. But such a proposition was scouted as ridiculous and we were forced back upon the 2 per cent. which was just enough for transportation of the sick. without allowing a single man for their care. This was not a new proposition. for the number of officers and men required in the different units of medical assistance, from the regiment to the base hospital, is just as clearly determined as is any fact in military organization.

We simply ignored our own experience and that of all other armies, and as a consequence, through no fault of the Medical Department, we fell short of the best results.

These remarks are pertinent to this report only in so far as the action taken affected the personnel serving here, which was typical, good. bad. indifferent, oftentimes excellent, but at all times crude.

As matters began to crystallize in the Department and the various medical organizations became no longer useful, the personnel attached and unattached began to gather around the established centers.

A provisional ambulance company was organized at Ponce under the command of a volunteer line officer to catch the flotsam and jetsam of the Hospital Corps. and it is to be feared that much of its membership remained such. The company was disbanded by order of the district commander before an order to that effect was issued from these headquarters, and its records. if there were any, disappeared. The men were sent to the general hospital at Ponce and many ultimately found their way to the company of instruction at San Juan. The reserve hospital and ambulance company of the First Corps at Guayama was broken up October 27, 1898, part of the personnel and most of its material came to San Juan. and the rest of its personnel to the provisional ambulance company at Ponce with the transportation.

The First Division, First Corps hospital, at Coamo. was closed early in December, its personnel coming to San Juan, and its material being distributed to several posts. By this elimination of stations and concentration of personnel, on December 31, 1898. as will be seen by reference to the foregoing table. of the 335 non-commissioned officers and men of the Hospital Corps present for duty. there were at the general hospital San Juan 4 hospital stewards. 10 acting hospital stewards, and 141 privates. Advantage was taken of this fact to organize a company of instruction. Excellent results followed the organization of this company and the

Medical Department was rapidly getting a trained personnel when the following order was issued:

General Orders, No. 44.
HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, April 10, 1899.

In compliance with verbal instructions from the Secretary of War, all enlisted men serving in this Department who are entitled to discharge from the service of the United States under the provisions of paragraph II, General Orders No. 40, Headquarters of the Army, Adjutant-General's Office, series 1898, as amended by paragraph I, General Orders No. 173, Headquarters of the Army, Adjutant-General's Office, series 1898, will, upon their individual application, be discharged the service of the United States by their respective company, troop, battery, or detachment commanders. Upon discharge, such soldiers as immediately reenlist in the Regular Army of the United States are entitled, and will be paid, travel allowances for land and sea travel from place of discharge to place of previous enlistment.

By command of Major-General Henry:

W. P. HALL, *Adjutant-General.*

By the operation of this order the Hospital Corps was at once reduced in strength to 130 noncommissioned officers and men.

The education of the sanitary soldier stationed elsewhere and of the men of the line was not neglected, as will appear from the following circular, issued December 28, 1898:

"The attention of medical officers in this Department is invited to the requirements of General Orders 36, headquarters Department of Porto Rico (herewith inclosed), and of Army Regulations (in which are included the Drill Regulations of the Hospital Corps) as to the instruction of line officers and the Hospital Corps.

"Surgeons of posts will for one hour each week during the months of January and February, 1899 (to be designated by the commanding officer), instruct the line officers of their commands in the following first-aid subjects:

"1. General outline of the structure and functions of the human body.

"2. Means of arresting hemorrhage, wounds and their treatment, fractures and their treatment, foreign bodies and their treatment, burns and scalds and their treatment, poisoned wounds and their treatment.

"3. Sprains and their treatment, blood spitting, insensibility, poisoning.

"4. Drowning, suffocation by gases, choking, sunstroke.

"5. Bandaging, bearer drill.

"The men of the Hospital Corps will be systematically instructed four hours each week in (1) nursing, (2) first aid, (3) the interior economy of military hospitals, and (4) bearer drill, including all matters laid down in Drill Regulations, Hospital Corps.

"A formal inspection of the Hospital Corps detachment, conducted as laid down in Drill Regulations, Hospital Corps, will be made every Saturday, and, so far as applicable, the interior economy of the detachment will be as prescribed in paragraph 266, Army Regulations, and following paragraphs.

"It is, of course, understood that military discipline of the highest order must be maintained in the Hospital Corps if the best results are to be obtained.

"Reports of instruction in detail of men of the Hospital Corps will be made monthly on the return of the Hospital Corps, giving class standing marked on a maximum of 10."

While the Government was not directly a large gainer by this instruction, as the men were only beginning to learn the scope and detail of their duties when discharged, nevertheless it is believed that there was an indirect gain in the fact that these men were able to carry home with them some systematic idea of their duties, which they never before had, and to disseminate a knowledge of them among their friends. One of the many handicaps we labored under during the war was that so few people in the Army or outside had any idea of what the duties of a sanitary soldier actually are, and it is a question if they yet have.

The total personnel on duty in this department since September 30, 1898, is as follows: Sixteen medical officers, United States Army; 13 medical officers, United States Volunteers; 73 contract surgeons; 9 hospital stewards; 52 acting hospital stewards; 430 Hospital Corps privates; trained nurses, male, 15; female, 127.

Boards were convened at San Juan, Ponce, and Mayaguez for the examination of all contract surgeons on duty in this Department. Fifty-two surgeons, all that remained on duty in January, were ordered to appear before the boards, of which number three declined examination and twelve were found unqualified. None of those who declined examination or were found wanting are now on duty here.

To replenish the Hospital Corps, two drafts of men were received from the United States, aggregating eighty-eight, and a number were reenlisted or transferred, making the total strength at this date:

	Present.	Absent.
Hospital stewards	4	3
Acting hospital stewards	18	2
Privates, Hospital Corps	120	3
Trained nurses (female)	8	
Civilian employees:		
Male	2	
Female	3	

It is believed that this number will prove to be in excess of the requirements of the department under present conditions, but as the sickly season is upon us, with the possibility of the necessity for organizing contagious disease hospitals and camps of refuge, it is deemed better to have a surplus than a deficit. By the time this season shall have passed the strength of the Hospital Corps will probably be at the required number, viz: Hospital stewards, 5; acting hospital stewards, 20; privates, 100.

The epidemic of disease which possessed the mind of the Army quite as much as the body (for 10 per cent noneffectiveness from sickness is not immobilizing) and sent a thrill through the hearts of mothers, wives, and sweethearts at home brought to our assistance the only trained organization that existed in our country for the care of the sick—the trained nurses. Miss Chanler and Miss Bouligney arrived in Porto Rico coincidentally with General Miles, and almost immediately established an officers' hospital at Ponce. They were soon followed by large numbers of nurses, who were distributed to fixed and camp hospitals all over the island, and many of whom did excellent work. They were greatly handicapped, though, by lack of proper organization into a nursing body, with head nurses, housekeepers, etc.: in a word, a cadre to give form and consistence. As a result of this lack of organization much unnecessary discomfort was imposed upon the nurses, and their work was by so much less effective. The experience of other armies for ages teaches us that women nurses undoubtedly have a place in fixed military hospitals, where they can be properly housed and surrounded. There their services are invaluable, for there is no nurse like a good woman nurse. God bless her! But in active service with a marching and fighting command they can not stand the awful hardships of a campaign, and they should not be permitted to serve in hospitals immediately with troops. In expressing these views I desire to acknowledge my obligations to the whole body of trained nurses, who, I have always maintained, have a place in medico-military organization. No better proof is needed of this than the admirable work done at the Sternberg Hospital, Chickamauga, which was organized under the writer, and was the first field hospital in our Army to be provided with a thoroughly organized corps of trained (women) nurses. In October trained nurses were on duty at the general hospital at Ponce, the First Division, First Corps hospital at Coamo, the First Corps reserve hospital at Guayama, and at the post hospitals at Mayaguez, Utuado, Arecibo, and Yauco. In November they assembled at the general hospitals in San Juan and Ponce, a few remaining at Mayaguez and Arecibo. As time passed and the volunteer troops departed the nurses followed, until to-day there remain on duty only six at San Juan and two at Ponce.

Fifteen civilian (male) nurses were on duty during the year. None remain.

During the campaign a large amount of medical supplies arrived with the troops. The First Division, First Corps, on leaving Chickamauga, denuded the depot there, and brought the allowance for two divisions, though but two brigades reached here. Other troops came equally well prepared, and material flowed in by the shipload. Add to this the very generous supplies sent by the various aid societies through their agents here, and it will be seen that at no time could there have been any lack, except possibly through the failure of medical officers to anticipate the wants of the sick, and by timely requisition to meet them.

No war was ever conducted without the assistance of those charitably disposed ones who are ever on the lookout to relieve suffering humanity. Recognizing this disposition, and realizing the inability of the medical service to meet the increasing demands of the sick of active armies without such assistance, those nations who have made war their unceasing study have sought to organize and train this charity to their own ends. Everywhere, save with us, the relation between the war aid societies and the war department is clearly defined. The character of the work to be done by each, the supplies to be furnished, the training and status of the personnel, all are made part of military regulations, and thus much confusion, waste, and consequent inefficiency are avoided.

The army in Porto Rico fared equally well with our troops elsewhere, and the supplies forwarded by the aid societies almost duplicated those from the regular sources. But owing to the fact that no responsibility attached to these goods, no requisitions, no receipts, no aftercoming property returns, and possible pecuniary loss, the aid supplies found their way to those for whom they were intended, but, alas! quite as often in the opposite direction, while the regular supplies, of which the amount was ample, remained uncalled for.

Realizing that justice to those who had been kind to us demanded that their kindness should not be imposed upon, shortly after my arrival here I issued the following circular to the chief surgeons of the districts:

"You will please notify the medical officers serving in your district that anything they may require from the aid societies will hereafter be asked for on formal requisition, which must be forwarded in duplicate for my approval. No material which is obtainable from the regular supply departments, or by legitimate purchase from subsistence or other funds, will be drawn from other sources, except in extreme emergency, which must be at once reported. When anything is obtained from any aid society formal receipt must be given for the same, and an account kept in a separate book, showing articles, amounts, and source from which received, and disposition of the same, which account must be carefully scrutinized by medical inspectors.

"You will please see that the instructions herein conveyed are brought to the attention of every medical officer in your district, who will file a written acknowledgment of their receipt, which you will forward to this office. Also notify the representatives of the aid societies in accordance with the foregoing."

Consequent upon this circular no further demands were made upon the aid societies, and their agencies were presently closed, the few goods remaining on hand being turned into the medical supply depot for issue to the sick. I am informed that after the closing of these agencies several consignments of goods were sent here, but what happened to them I am unable to say. It is to be feared that the red cross became, instead of a badge to command respect, an invitation to robbery and misappropriation.

A medical supply depot, under the charge of First Lieut. F. M. Hartsock, assistant surgeon, United States Army, was established in the basement of the general hospital at Ponce early in August, in which was accumulated a large field supply. This was broken up in December and the material transferred to a depot established in San Juan. Maj. Louis Brechemin, surgeon, United States Army, in charge of the last-named depot, has been active in the work of supplying the various posts, most of which were very ill supplied with permanent appliances at the date of the establishment of the San Juan depot, and has organized his department in a way to promote the interest of the service and reflect credit upon himself. As was to be expected, a considerable surplusage of folding field furniture, chests, and bedding, especially blankets and mattresses, accumulated during the campaign and now remains on hand. My purpose is to keep a sufficient reserve at the permanent hospitals at Ponce and Mayaguez, to meet the stress of a few weeks interval, should the depot here be destroyed by fire or other cause. At the depot I will maintain a complete outfit for a 500-bed field hospital, to meet the requirements of possible camps of refuge. The smaller posts are provided with field furniture adequate for their commands, and it is believed that no emergency will find the medical department unprepared in this direction. What remains above these requirements can be spared, and is now being shipped to the supply depot in New York. Considerable trouble has heretofore resulted from the distribution of supplies, owing to delays and losses in shipment by the Quartermaster's Department. Robbery was rife, and it seemed at one time as though no box marked with a red cross (as all medical supplies are marked) could pass without paying toll. With more perfect organization and better personnel this condition is disappearing and shipments are reaching their destination more promptly.

During the period of active operations a large number of ambulance wagons were brought to Porto Rico, which have been turned over to the Quartermaster's Department, and are now being used for the various purposes of transportation. While this use is contrary to regulations, it seems to have been necessary, as for a long time no other spring wagons were available. These ambulances are all more or less dilapidated, and will soon be unserviceable. If better wagons are to be furnished, the disappearance of these is a consummation devoutly to be hoped for.

The present garrison in Porto Rico is made up of the Fifth United States Cavalry (the entire regiment); Fifth United States Artillery (Batteries E and G, the former arriving in March); Eleventh United States Infantry (entire regiment); Porto Rican Infantry Volunteers (battalion), and detachments of the Signal and Hospital Corps, United States Army.

The average strength of the command for the six months was 4,322, and on June 30, 1899, was 3,142 officers and men, distributed among twelve posts, five subposts, and one general hospital. On that day 241 men were reported as having been noneffective from disease during the previous week, a per cent of 9.02.

Attention is respectfully invited to the accompanying statistical tables showing the movement of sickness in October, November, and December, 1898, and the movement and character of sickness for each month since January 1, 1899. The last named are consolidations of the weekly reports received in this office from the various posts, which enable me to keep constantly informed regarding the health of the command. I regret to say that they bring very little information concerning the civil vital statistics of the garrison towns.

It will be observed that no records are available for August and September, 1898. Whether or not such are extant I am unable to say. I am, however, certain that so much of the command (two brigades) as arrived from Chickamauga were more or less infected, and presumably the rest of it was equally so. Inasmuch, however, as only the well accompanied these commands, we may assume that the percentage of noneffectiveness from sickness was not large during this period.

The percentage of sickness at individual posts, as shown by the last weekly reports, July 22, 1899, is—

	Per cent.		Per cent.		Per cent.
Adjuntas	15.36	Humacao	5.10	San German	9.30
Aguadilla	3.09	Lares	4.12	Vieques	2.50
Aibonito	11.57	Manati	6.00	Porto Rican Battalion Volunteers	3.53
Arecibo	7.28	Mayaguez	8.30		
Bayamon	4.04	Ponce	9.33		
Cayey	13.80	San Juan	4.42		

Number of sick in general hospital, San Juan, 58.

The lowest daily rate of noneffectiveness occurred in May, being 42.21 per thousand. The highest rate occurred in June, being 94.4 per thousand. It is probable that at least 1 per cent of the apparent sickness is chargeable to the inexperience of the surgeons here, who, as physicians in civil life, were educated to believe that every man who said he was ill must be so, since he was willing to pay the usual fee to support his statement; but in military life no fee attaches, and the proportion of malingerers grows with success in malingering.

The admission rate per annum, based on the returns for the six months including June 30, 1899, is 3,347.06 per thousand of strength. Total number of cases discharged on surgeon's certificate of disability for the same period was 45, a rate of 20.8 per thousand per annum. The discharge rate is slightly above the army average; but the greatest care was taken that no man should be discharged for disability until after his case had been under observation in a general hospital. The total number of deaths reported during the same period is 23, a rate of 10.7 per thousand per annum, with causes as follows: Infectious diseases, 11; accidents and injuries, 4; pulmonary diseases, 2; digestive diseases, 4; suicide, 1; circulatory diseases, 1.

Of the 7,383 cases treated since January 1, 1899, 27 per cent were sick from digestive diseases, 15 per cent from malaria, and 14 per cent from venereal diseases. Less than 1 per cent had typhoid fever. The remaining cases were equally distributed throughout the official nosological table.

The number of cases of typhoid remaining under treatment from December was 44, which may be charged to the period of active service; 4 were taken sick in January, 3 in February, 3 in March, 2 in April, 9 in May, and 11 in June. It is observed that the sudden rise in May is coincident with the arrival of recruits from home.

The largest number of cases of venereal diseases—20 per cent of the total sickness and 7 per cent of the total strength—was reported in April. This may well furnish occasion for thought. With a constant noneffectiveness from venereal diseases of 12 per thousand (double the home average), it is not difficult to conclude that it will be but a short time before a very large percentage of all the troops in Porto Rico will be syphilized, as indeed is the population here. But this is not all. Our soldiers returning home will spread wide there the infection acquired here, and thus we will have to face the question now so burning in Great Britain. What shall we do to prevent our soldiers abroad and our people at home from being syphilized?

The superior board of health (now organizing here) will take up this question vigorously and it is hoped successfully.

Of digestive diseases, 630 cases were reported as taken sick last month (June) alone, being 41 per cent of the total sickness and 20 per cent of the total strength of the command. I believe that a large proportion of this sickness is preventable by vigorous effort on the part of company commanders. The organizations here are made up of recruits who know nothing of the business of soldiering and little of how to take care of themselves. They eat and drink whatever and wherever the spirit moves: they become overheated and then seek a draft in which to cool off; they give themselves over to licentiousness, and their weakened bodies invite disease. It seems to me that if our line officers knew more of the duties of medical officers and the latter more of those of line officers the combination would be advantageous. I can find nothing in the character, quality, or cooking of the ration that would account for the excessive amount of digestive trouble.

February shows 227 cases of malarial fever taken sick, the largest number of any month, being 18 per cent of the total sickness and 4 per cent of the total strength. Diagnoses of malarial fever were confirmed by bacteriological examination in the general hospitals, but this was impossible at many of the smaller stations, and without such examinations there is always a question. The course of many of the cases of so-called malaria is by no means typical, and leaves it an open question as to what the disease actually was.

Considerable valuable bacteriological work has been done during the year in connection with this subject, and it is hoped that in due time we will be able to differentiate between the mushroom and the toadstool.

Movement of sickness in the Department of Porto Rico, based upon the records January 1 to June 30, 1899.

[Average strength of command 4,322 officers and men.]

	January.	February.	March.	April.	May.	June.	Total.
Taken sick	1,747	1,207	1,021	1,144	749	1,515	7.383
Daily average	439.8	395.8	334.6	252.3	134.2	2.073	294.0

RATES PER THOUSAND MEAN STRENGTH PER ANNUM.

	Admissions.	Constant nonefficiency.	Discharges.	Deaths.
Venereal diseases:				
United States Army, 1897	84.59	5.65		
Department of Porto Rico	467.80	12.00		
Malarial diseases:				
United States Army, 1897	92.82	2.40		
Department of Porto Rico	509.48	10.00		
Digestive diseases:				
United States Army, 1897	113.65	1.32		
Department of Porto Rico	916.24	10.40		
All diseases, Department of Porto Rico	3,347.06	67.87	20.80	10.64
United States Army, 1897	1,186.61	35.85	19.78	7.32

Nonspecific cutaneous diseases are quite prevalent, the flea, mosquito, and the heat being prominent causative factors.

A considerable number of civilians attached and of citizens sojourning in Porto Rico have been treated in the military hospitals, which have been a haven of rest to these classes, for without our hospitals there would have been no place for them to lay their heads. The Medical Department will not lack for the kindly consideration of those who have thus been succored.

A case of Malta fever (see page 286) was studied in the general hospital at San Juan and made the subject of an interesting report by First Lieut. Walter Cox, assistant surgeon, United States Army, pathologist to that hospital, who also submitted a report upon a case of epidemic cerebro-spinal meningitis. For the most part, though, this has been a year of organization, and the hands and hearts of the medical officers have been filled with the care of the actual sick, the setting of their hospitals in order, and the training of their personnel. Hence this could not have been a period of literary effort, but of hard, practical work, which is even not yet accomplished.

Seventeen cases of hernia were treated at the general hospital, San Juan, during this year. Of this number five submitted to operations (Bassini's) and were cured, ten were returned to duty, and two discharged on surgeon's certificate of disability. All not operated upon were offered the opportunity, but declined.

Monthly reports under paragraph 1393, Army Regulations, have been regularly rendered and carefully scrutinized since the organization of the department. It may be said that the sanitary conditions obtaining during the Spanish occupation were in no sense up to modern standards. We inherited habitations that we could not occupy without serious detriment to our troops, and have been at work for many months trying to make them habitable. Great effort and considerable means have been expended to this end, but I am persuaded that the present habitations will be only temporary. We certainly should do here as at home—separate our garrisons from the cities, and locate our posts in the open country, with enough surrounding land to permit of proper military exercises, and enough air space to give our men their full share of oxygen. At present, barracks are located in the cities and surrounded by dives occupied by the vilest creatures, where temptation to all kinds of debauchery is thrust upon our men. These barracks are gradually being supplied with some of the modern conveniences, but I have yet to see one that I thought was in anywise comparable with a modern military barrack at home. Several of the stations are without permanent quarters, and the troops are occupying hired quarters, more or less comfortable, but not built for nor suitable to the purposes of a barrack. Men can put up with much discomfort when necessary, but should not be permitted to be uncomfortable when it is unnecessary; therefore I say we need new posts, such as the best at home, and, in the interest of efficiency and economy, should have them as soon as possible.

Sewers are being introduced and modern water-closets, baths, sinks, basins, etc., are slowly making their appearance—a veritable object lesson of sanitation to this people, to whom a fecal odor must have become second nature. The Ballaja Barracks at San Juan and the cuartels at Mayaguez and Ponce are being placed in as good sanitary condition as their construction will permit, and will serve for temporary occupancy. The standard earth closet is being used at most of the posts.

Waterworks exist in the three above-named cities and also at Arecibo; in other places water is supplied from cisterns or neighboring streams. All water in Porto Rico is suspicious, and should always be boiled or filtered, or both.

Clothing is now provided in ample amount, and is suitable; in fact the variety of "uniform" is so great that there is very little uniformity about it. Nothing more suitable than white duck for garrison and khaki for the field can be found. I think it important that the men should be required to wear light woolen underclothing, particularly shirts; for chilling is an easy matter in this hot country, and nothing is more dangerous than getting chilled.

The bathing facilities at all posts have until recently been limited by the proximity of the neighboring streams, and such is the case at most of the stations to-day. Shower-baths are being put in at San Juan, Ponce, and Mayaguez; lavatories are nonexistent.

About 3 per cent of all cases treated were classified under nervous diseases, and a large proportion of these cases was due to the effects of alcohol. It has already been shown that the visible percentage of venereal is 7 per cent. I say *visible*, as it is well known that not one-half of such cases get into the books of the Medical Department, the infected seeking treatment from outside sources (the chief object of which is to avoid a record which might vitiate a probable claim for pension). It may therefore be said that the habits of the men are not yet up to the standard. This is not surprising, considering all the circumstances of the year and the present surroundings of the troops.

Acclimatization stations were established by the Spaniards at several points in the hill country, to which newly arrived and broken-down soldiers were sent. Cayey and Aibonito were evidently selected for permanent occupancy, as shown by the structures erected there. In addition there is a station in the west at Las Marias, 15 miles from Mayaguez, with a fairly comfortable wooden barrack; also at Adjuntas, 20 miles north of Ponce, and at Utuado, 24 miles south of Arecibo. Lares is contiguous to Aguadilla.

The locations of these stations indicate the lines of evacuation in the event of the appearance of yellow fever, and preparations looking to the establishment of permanent camps at any or all of them, in case of necessity, have already been made. It is believed it would be in the interest of efficiency as well as economy if, instead of altering the building now at Cayey, a new hospital be built there capable of accommodating from 30 to 50 patients. To this hospital patients recovering from disease could be sent to convalesce, instead of sending them home at considerable cost and greater loss of service.

Attention has already been invited to the correspondence looking to an arrangement with the owners of Coamo Hot Springs by which our soldiers who may suffer from diseases benefited by the waters of the Hot Springs of Arkansas could be from diseases benefited by the waters of the Hot Springs of Arkansas could be treated here instead. I am informed that the medicinal virtues of the two waters are identical and that we can expect identical results from treatment. It is believed that time and money will be saved if an agreement can be reached.

The dependencies that have come to us through the recent war are making demands upon the military personnel in the way of civil work that is little appreciated by those who have not had service therein. A large percentage of the line officers serving here are devoting themselves to the solution of civil problems of the highest importance, and the medical officers must bear their share in the work. Realizing this, and the fact that sanitary questions are by no means the least important that are to be solved, I have made numerous reccommendations looking to systematic sanitary organization in Porto Rico, but such organization did not take form until the arrival of the present department commander, who, in approval of my recommendations, issued the following order:

General Orders, No. 91. | HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, June 29, 1899.

I. A superior board of health is hereby constituted for Porto Rico, the authority of which will extend throughout this department, and to which all local boards of health will regularly report.

The board will for the present be composed of six members, as follows:

Maj. John Van R. Hoff, surgeon, United States Army, chief surgeon of the department; Surg. Arthur H. Glennan, United States Marine-Hospital Service; Surg. F. W. F. Wieber, United States Navy; Dr. George G. Groff, Dr. Gabriel Ferrer, Dr. Ricardo Hernandez.

The chief surgeon of the department will act as president of the board and Dr. George G. Groff is appointed secretary and treasurer.

The office of the board will be at these headquarters, where its meetings will ordinarily be held, at such times as may be appointed. Four members will constitute a quorum.

The board will meet as soon as practicable to prepare regulations covering the scope of its work, which will be submitted to the department commander.

II. On and after July 1, 1899, the management and control of the insane asylum at San Juan, now under charge of the bureau of education, will be transferred to to the superior board of health of Porto Rico, and the public funds allotted for the support of the asylum will be disbursed and accounted for by the treasurer of the board under its direction.

By command of Brigadier-General Davis:

W. P. HALL, *Adjutant-General.*

Under this order, with the material support of the department commander and the moral support of the medical departments of all the public services, each of which has a representative on the board, with two distinguished members of the profession in Porto Rico, and a permanent secretary whose many years' experience as a public sanitarian must be of the greatest value, it will be strange indeed if the board does not prove a success.

General Orders, No. 102. | HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, July 18, 1899.

For the information of all concerned, the following orders are published relative to the duties of the superior board of health constituted for the island of Porto Rico by General Orders, No. 91, current series, these headquarters.

It shall be the duty of the superior board of health—

I. To have general supervision of all the interests of the public health of the island, and to especially study its vital statistics.

II. To make sanitary investigations and inquiries respecting the causes of disease, and especially of epidemic diseases, including those of domestic animals, the sources of mortality, and the effects of localities, employments, condition, habits, food, beverages, and medicine on the health of the people.

III. To disseminate information upon these and similar subjects among the people.

IV. To institute sanitary inspections of all public institutions or places throughout the island.

V. To consider and report to the governor upon the plans and specifications for all new water supplies, drainage, sewerage plants, and public institutions of all kinds, or for alterations in such public works or institutions. Copies of such plans and specifications will be filed in the office of the board.

VI. To suggest amendments to the sanitary laws of the island and to have power to enforce such regulations as will tend to limit the progress of epidemic diseases.

VII. To have power and authority to order nuisances or the causes of any special diseases or mortality to be abated and removed, and to enforce such interior quarantine regulations as said board shall direct in cities, municipalities, districts, or places where there are no local boards of health, or in case the sanitary laws or regulations should be inoperative in places where boards of health or health officers exist. Any person who shall fail to obey or shall violate such order shall upon conviction be sentenced to pay a fine of not more than $100 or be imprisoned for not more than sixty days, at the discretion of the court.

VIII. To have general supervision of the insular system of registration of births, marriages, and deaths, and of prevalent diseases, and to insure the faithful recording of the same; also to prepare the necessary methods, forms, and blanks for obtaining and preserving such statistics.

IX. To prepare regulations governing the admittance of persons to the practice of medicine and surgery, pharmacy, dentistry, midwifery, embalming, and undertaking, and to enforce such regulations as are adopted by the government of the island.

X. To inquire into and report upon violations of laws governing the purity and wholesomeness of foods, drinks, drugs, and medicines. To submit, through the governor of the island, regulations to control offensive and dangerous occupations, and to report upon and make recommendations regarding any special sources of danger to life or person.

XI. To require all health officers and health boards throughout the island to forward to the superior board copies of all their reports and publications, and such other sanitary information as it may request. To require reports and information concerning such matters or particulars, in respect of which it may, in its opinion, need information for the proper discharge of its duties from all public dispensaries, hospitals, asylums, infirmaries, prisons, penitentiaries, schools, and from the managers, principals, and officers thereof, and from all other public institutions, their officers and managers, and from the proprietors, managers, lessees, and occupants of all places of public resort throughout the island.

XII. To from time to time engage suitable persons to render sanitary service, or to make or supervise practical and scientific investigations and examinations requiring expert skill, and to prepare plans and reports relating thereto. This regulation must not be considered as authorizing any expenditure beyond the sum specifically allotted to the board for such purposes in the annual budget. When the cost of such investigations exceeds the allotment, special authority for the expenditure must be obtained from the governor of the island.

XIII. To make a written report to the governor on or before June 30 of each year, covering the general sanitary conditions of Porto Rico; the work of the officers and agents of the board: and a detailed statement by the treasurer of all moneys received and disbursed during the year. To submit special reports from time to time as the occasion may demand.

XIV. To especially supervise subjects directly relating to public health, as follows:

1. Public water supplies.
2. Markets, bakeries, groceries, and milk depots.
3. The purity and wholesomeness of all foods, drinks, liquors, drugs, and medicines.
4. Public institutions, schools, asylums, jails, hospitals, dispensaries, barracks, court-rooms, theaters, etc.
5. Tenement houses.
6. Vital statistics, marriages, births, deaths.
7. Licensing and registration of physicians and surgeons, dentists, pharmacists, midwives, undertakers, etc.
8. Plumbing, and registration of plumbers.
9. Sewering.
10. Street cleaning.
11. Privies, water-closets, cesspools, etc.
12. Nuisances.
13. Slaughterhouses, stables, yards.
14. Contagious and infectious diseases.
15. Trades, factories, and industries offensive or injurious to the public health.
16. Undertaking and cemeteries.
17. Disinfection.
18. Licenses and permits.
19. Vaccination and the production of vaccine virus.
20. Diseases of domestic animals communicable to man.
21. Interior quarantine.
22. Poisons, explosives, and special sources of danger to life and person.
23. Sanitary supervision of travel and traffic.

XV. To institute prosecutions for violations of the provisions of this order in the nearest local court, or in the United States provisional court, as the governor may direct.

By command of Brigadier-General Davis:

W. P. HALL, *Adjutant-General.*

The most important sanitary work thus far undertaken by the Medical Department here was the vaccination of the whole population of Porto Rico, which is now completed so far as this organization was to carry it. Upon my arrival here I found, not unexpectedly, that smallpox was endemic, a condition common to Spanish-American countries, and immediately announced my intention of endeavoring to eradicate the disease.

On December 19, 1898, I recommended that the necessary steps be taken to have the people of the island vaccinated, and to require that hereafter all children be vaccinated within six months of birth. As a consequence of this letter, a general order was issued to alcaldes to carry out its recommendations, which of course they could not do. The vis a tergo in the form of the military government gave the impulse, but careful organization only could produce the desired result. After careful consideration of all matters necessary to the success of the undertaking I recommended that a sufficient amount be allotted from the civil funds to permit of the immediate starting of a vaccination among the people of the island, and that Dr. Azel Ames, acting assistant surgeon, be placed in immediate charge of the work. On January 23, 1899, I submitted a draft of an order directing the vaccination of the inhabitants of Porto Rico, which was accepted with some modifications (though all suggestions were finally accepted and promulgated in orders during the course of the work), and issued as follows:

General Orders, No. 7. HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, January 27, 1899.

I. The inhabitants of this island must be protected from smallpox. Every resident who has not had this disease will be vaccinated, and hereafter all infants must be vaccinated before reaching the age of six months.

II. The chief surgeon of the department is charged with the duty of providing the material and carrying out the details necessary in the work of vaccination.

III. The following-named officers of the Medical Department are hereby appointed directors of vaccination and assigned to the designated divisions for temporary duty:

Maj. P. R. Egan, brigade surgeon, United States Volunteers, to the division of Guayama, and of Humacao, south of the municipality of Naguabo, and including Vieques, with headquarters at Guayama.

Maj. George G. Groff, brigade surgeon, United States Volunteers, to the division of Arecibo, with headquarters at Arecibo.

Capt. Charles Willcox, assistant surgeon, United States Army, to the division of Mayaguez and Aguadilla, with headquarters at Mayaguez.

Capt. F. P. Reynolds, assistant surgeon, United States Army, to the division of San Juan and of Humacao, north of and including the municipality of Naguabo, with headquarters at San Juan.

Acting Asst. Surg. Azel Ames, to the division of Ponce, with headquarters at Coamo.

IV. In addition to his duties as director of vaccination, Acting Asst. Surg. Azel Ames will take charge of the production and distribution of the necessary supply of vaccine virus.

V. The above-named officers will report by letter to the chief surgeon of the department for the necessary instructions in the performance of this duty.

VI. All medical officers serving at posts in the different divisions are hereby detailed as inspectors of vaccination, and will report, when their services are required for this purpose, to the directors of their respective divisions. The care of the sick of the command must not be neglected in performing this special duty. All other officers will render any assistance they may be called upon for in facilitating the work of vaccinating the people.

VII. Inspectors of vaccination will report to the chief surgeon of the department any neglect on the part of the civil authorities to carry out this order, with view to such action as may be deemed necessary by the department commander.

By command of Major-General Henry:

FRANK McINTYRE,
First Lieutenant, Nineteenth Infantry,
Acting Assistant Adjutant-General.

The department is indebted to each and every officer and enlisted man engaged in the work for the successful carrying out of an almost unprecedented undertaking. It is particularly indebted to Major Groff for suggestions, blanks, and circulars pertaining to the field work of vaccination; to Major Ames (appointed brigade surgeon, United States Volunteers, while the work was in progress) for the organizing of the vaccine station and the assembling of material there; to Captain Reynolds for the perfecting of the work of the station and materially increasing the output; to Dr. Leary for the scientific work of the station and an enthusiasm which went far toward making success possible; and finally, to Mr. Simon Moret, a patriotic citizen of Porto Rico, who furnished the cattle for vaccinifers, without which there could have been no vaccination of the people.

A detailed report of the work will be submitted later.

Total number of vaccinations reported 786,290; cost, $28,536.17.

Division.	Vaccinated.	Cost of vaccinating.
San Juan	140,312	$3,851.95
Arecibo	166,244	3,838.13
Mayaguez and Aguadilla	156,320	3,244.86
Ponce	168,551	4,500.60
Guayama	154,863	2,889.50
Vaccine station		10,113.73
Total	786,290	28,536.17

The cost of vaccinating one person was $0,0234.

March 30, 1899, the War Department authorized the expenditure of $30,000 from the insular fund for vaccination purposes, and the disbursements above set forth are from that source, having been paid principally to physicians of the country for actual vaccination work and for the expenses of the station. The latter were in excess of the original estimate, owing to the discharge from the service of many of the hospital corps men who were detailed on that duty, and the hiring of civilians in their places; a considerable number of the men of the hospital corps, however, remained on duty at the station until it was discontinued. The unexpended balance was turned into the treasury of Porto Rico. The cost of this somewhat unique undertaking was about equally divided between the United States and the island, the former providing the personnel for the supervision of the work and a large share of those engaged in producing vaccine virus, together with all the material and much of the transportation, while the latter contributed to the production of virus and its actual introduction into the arms of the population. The work was not accomplished without encountering difficulties and opposition, but they were not too great to be overcome, and the result justifies the undertaking.

General Orders, }
No. 92. }

HEADQUARTERS DEPARTMENT OF PORTO RICO,
San Juan, July 1, 1899.

The vaccine station at Coamo Springs, Porto Rico, is discontinued from this date, and the commanding office will have all the records and property pertaining to that station carefully marked in a way that they can be readily distinguished, boxed, and forwarded to San Juan. The quartermaster's department will furnish the necessary transportation.

By command of Brigadier-General Davis:

W. P. HALL, *Adjutant-General.*

To complete the work and continue it through the future a vaccine station will be established under the auspices of the superior board of health and compulsory vaccination will continue to be enforced.

The work of the Medical Department of the Army during the last year has been arduous beyond description, and its officers have devoted their strength, health, and their lives to its accomplishment. Blame has fallen upon it where no blame was merited, and commendation has come slowly and grudgingly. Its officers have reaped no material advantage, for they are without honors or promotion, while these are falling all about upon others who have left them far behind in the race.

But I predict that in the cold light of history the results of the work of the Medical Department of the United States Army in the war of 1898 will be accepted as one of the most remarkable outcomes of that war.

Respectfully submitted.

JOHN VAN R. HOFF,
Major and Surgeon, United States Army,
Chief Surgeon.

The SURGEON-GENERAL UNITED STATES ARMY,
Washington, D. C.

THE MEDICAL DEPARTMENT OF THE ARMY TRANSPORT SERVICE.

On November 16, 1898, the regulations drawn up for an Army transport service by a board of officers, of which Maj. Gen. William Ludlow, United States Volunteers, was president, were approved and published for the information and guidance of all concerned. Two headquarters for the service were immediately organized—one at New York City, N. Y., for the Atlantic traffic; the other at San Francisco, Cal., for the trans-Pacific traffic.

The following offices were organized at each headquarters:

1. General superintendent.
2. Assistant to general superintendent.
3. Medical superintendent.
4. Transport quartermasters and commissaries.
5. Transport surgeons.
6. Marine superintendent.
7. Assistant to marine superintendent.
8. Superintending engineer.
9. Assistant to superintending engineer.
10. Port steward.
11. Chief stevedore.
12. Army transport agents at over-sea ports.

The duties of these offices were severally specified in the approved regulations. The prescribed status of the medical superintendent required that he should be an officer of the Medical Department of the Army, stationed with the general superintendent and acting as his assistant and professional adviser in all matters pertaining to the sanitation and hygiene of the transports and to the hospital and medical accommodation and service on board. He was required to make personal and minute inspection of each transport on arrival and prior to departure and to submit to the general superintendent such recommendations relative to sanitation and hospital equipment as he might deem needful. He was required to make himself familiar with the quarantine laws and facilities at home and over-sea ports and be responsible for the competency and satisfactory service of the transport surgeons and all other employees of the medical department of the transport service.

The duties of the transport surgeons were prescribed, as follows:

> To each transport will be assigned a transport surgeon, who will be selected or appointed with special reference to the needs of the transport service, and, under direction of the medical superintendent and of the transport quartermasters, will act as the medical officer of the ship. He will be responsible for the proper hospital equipment and supplies of the vessel, for its proper and thorough sanitation, for the care and treatment of the sick and injured, and for the satisfactory service of the hospital employees.

To meet the requirements of the service for transport surgeons, as well as for the general service, a board of medical officers was assembled in New York City, and candidates for the position of contract surgeon were invited by the Surgeon-General of the Army to appear for examination. The following circular of information for applicants was printed and distributed by the board:

> The following requirements are exacted by the board of examiners:
>
> Evidence of graduation at a regular reputable medical college; diploma to be submitted to the board.
>
> Proof of hospital or other professional experience will be of benefit to the candidate.

Candidates must be in good health, of reasonably sound physique, and citizens of the United States.

The examination is of a practical nature, embracing hygiene, practice of medicine, pathology, and surgery. In addition a thesis on some professional topic will be prepared by the candidate. The following questions submitted to former candidates are published as a guide to applicants:

1. What chemical and physical qualities of water would lead you to suspect its potability?
2. What are the varieties and pathology of felon?
3. What is Widal's test?
4. What are the modern methods of treating diphtheria?

The pay of acting assistant surgeons is $150 monthly.

The applicant must be free from physical defects which would incapacitate him for the military service.

For further information address Maj. H. S. Kilbourne, surgeon, United States Army, Army Building, 39 Whitehall Street, New York City, President of Board of Examiners.

The board continued in session until April, 1899, when, surgeons having war service being available for assignment to transports, it discontinued its work.

Circulars of instruction were prepared at the headquarters of the service in New York City, N. Y., and were distributed to transport surgeons as follows:

Under the provisions of paragraph 11 of the Regulations for the Army Transport Service the following instructions for the conduct of the medical service of those vessels will be observed:

1. On the arrival of a transport at this port the surgeon will report in person, without delay, to the medical superintendent, submitting such reports of the sanitary condition of the ship orally or in writing, as may be required.

2. On arrival at this port surgeons will prepare and forward to this office special requisitions on the regulation blank forms (or lists in the absence of such forms) for medical supplies required for the proper equipment of the ship from the standard supply table given in the Manual of the Medical Department.

At other ports, in cases of emergency, where medical supply officers are stationed, supplies may be obtained in the same manner, one copy of the requisition being sent direct to this office.

3. Surgeons will strictly observe the quarantine regulations in force at ports visited by transports, and in the case of the appearance of infectious diseases on board while at sea will take prompt action for their isolation.

4. The following record and reports are required:

(1) Information slip book.
(2) Morning report book, sick and wounded.
(3) Morning report book, Hospital Corps.
(4) Order and letter book.
(5) Register of the Hospital Corps.
(6) Register of patients (field).
(7) Monthly report of sick and wounded.
(8) Personal reports (monthly and changes).
(9) Return of personnel of Hospital Corps.
(10) Return of medical property (annual and on changing station).
(11) Muster and pay roll of Hospital Corps.

Blank forms for the preparation of the foregoing records and reports may be obtained on application at this office.

A record of all cases treated in the ship's hospital will be kept, from which the reports of sick and wounded are compiled. Transport surgeons will apply to this office for copies of the Regulations of the Army Transport Service and Manual of the Medical Department unless they have been otherwise supplied.

All medical supplies for fitting out transports were promptly furnished by the medical-supply depots on requisition approved by the medical superintendent. Medical supplies for three months for the maximum number of troops and crew carried by the transports were placed on board and replenished, when necessary, on the return voyage. The medical personnel of each transport consisted of one acting assistant surgeon, one steward or acting steward, and from one to three privates of the Hospital Corps, according to the needs and accommodations of the ship. Since January, 1899, the transports *Grant*, *Sherman*, and *Sheridan* were dispatched, with a full complement of troops, by way of the Suez Canal, to the Philippine Islands. These vessels are now plying on the Pacific route between San Francisco and Manila. Plans for refitting the *Logan* and *Thomas*, sister ships, on the general plan of the troop ships are now under consideration. The plans include facilities for heating, ventilation, and refrigeration, for lavatories, closets, and baths, and for the berthing and messing of four battalions of infantry, with hospital accommodations for sixty patients on the main deck aft, including operating room, dispensary, attendants' rooms, etc.[1]

Between San Francisco, Cal., and the Philippine Islands the work of the transport service during the past year has been very satisfactory. Medical officers in their reports have invariably invited attention to faults of construction and management brought to light by their experience.

A report of Maj. D. G. Fairchild, surgeon Fifty-first Iowa Infantry, dated February 1, 1899, on board the transport *Pennsylvania*, in Cavite Harbor, P. I., states that on January 1, 1899, the regiment had been fifty-nine consecutive days on shipboard en route to Manila, in Manila Bay, en route to Iloilo, and in Iloilo Harbor. The fresh water in the tanks became exhausted December 9, 1898, after which condensed water was used, the ship's condensers having an output of 2,400 gallons daily. Every care was given to the food, clothing, cleanliness, and exercise of the men, to the sunning of their personal baggage, and the scrubbing of their quarters. The ship's boats were used for drills and exercise while in Iloilo Harbor. During all this time there was no death nor any serious sickness in the regiment.

Two reports are submitted below to show the usual conditions under which the voyage to Manila was made:

REPORT OF MAJ. HENRY I. RAYMOND, BRIGADE SURGEON OF VOLUNTEERS, ON THE VOYAGE OF THE TRANSPORT "SENATOR" FROM SAN FRANCISCO, CAL., TO MANILA, P. I., APRIL 27 TO MAY 28, 1899.

On leaving San Francisco Harbor 688 enlisted men and 19 officers were on board. Only 1 death occurred, and that by drowning. Most of the voyage, therefore, was made with (in round numbers) 700 officers and enlisted men. This I consider to be the maximum safe capacity of this transport from a sanitary standpoint.

The lower deck, fore and aft, has no portholes, and the system of ventilation by means of wind sails and electric fans does not afford that change of air required in dormitory from sanitary considerations, and the exclusion of sunlight makes these lower decks unfit for habitation during the daytime. If the men were compelled to remain below night and day from stress of weather or other cause, it could not but result during a prolonged voyage in a markedly lowered vitality of the system and probably the appearance of infectious disease. Fortunately, the men occupying these lower decks have been required to sleep on the spar deck and remain in the open air much of the daytime, and the critical inspection of the transport by the commanding officer of the troops and by the master of the ship, with strict enforcement of sanitary police, has made it possible to complete our voyage without the appearance among us of any preventable disease or any decline vital resistance.

On the main deck, fore and aft, are well-ventilated and sunlighted compartments, having an air space of about 23,000 cubic feet and furnished with stands of three bunks each. This deck has afforded ample accommodation for 283 men, allowing cubic feet of air space per man. No storeroom being available for the men's equipments, these articles have encroached somewhat upon the available air space and made it awkward and difficult to get about at inspection of quarters. As perfect cleanliness of floors is of the first importance, there should be no lack in providing scrub brushes, sapolio, and buckets for the voyage. Inspection of meals by company and detachment commanders has failed to establish any cause for complaint, with perhaps a single exception, due to the use of beef too recently after slaughter of the animal at Honolulu. Exercise of the men by means of gymnastic drills, the proper care of the skin by douche and tub baths, and provision for a liberal change of underwear have been carefully looked after, and have contributed to the men's comfort and health.

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[1] These improvements were completed November 10.

Six hundred points of vaccine virus were used during the voyage, giving 108 successful vaccinations or revaccinations.

The diseases noted on sick report are chiefly cases of specific urethritis and vaccinia.

Hospital cabins require better ventilation.

From a sanitary point of view our voyage has been an extremely favorable one

REPORT OF ACTING ASST. SURG. P. W. BECKMAN, UNITED STATES ARMY, ON THE VOYAGE OF THE TRANSPORT "OHIO" FROM SAN FRANCISCO, CAL., TO MANILA, P. I., APRIL 27 TO MAY 29, 1899.

A total of thirty-four days was consumed in the voyage, including seventy-two hours spent at Honolulu, H. I. The troops on board consisted of six companies of the Thirteenth United States Infantry and detachments of recruits. of Signal Corps, and of Hospital Corps men, making a total of 783 officers and men. The capacity of the boat for passengers is estimated at 794 officers and men, exclusive of the crew; breathing space estimated at 120 cubic feet per man. The troops were quartered on lower and main decks, although after the first few days, when the weather became warm, over one-half of the men slept on the upper deck, and al men not on duty were required to spend the greater portion of their time there.

Temperature below the upper deck averaged about 90° F. Air circulation was hardly adequate to give a fair degree of comfort at this temperature. Ventilatio natural, with the exception of four rotary fans in each compartment, lower deck being divided into four compartments and main deck into two, with numerous smal rooms, interfering very much with proper ventilation, those not next to portholes being uninhabitable on account of high temperature and lack of free circulation Inlet of air by portholes, wind sails, and a few cowls; egress by hatchways. Som of the fans and one dynamo failed to work in a satisfactory manner. There was also considerable humidity on lower deck, due to imperfection in various drain and to the fact that this deck was not painted and was somewhat sogged with moisture, although no more water was used than was absolutely necessary to keep it clean. Had the weather been very rainy and any great number of men been required to remain below, the atmosphere would have been very oppressive. To secure thorough ventilation all appliances for that purpose should be constantly kept in use and provision made for any breakdown. More powerful rotary fan should be substituted for those in use. Further, there should be as little obstruction to circulation as possible and any cause responsible for humidity should be corrected.

Lavatories are located forward and aft on the main deck except two trap closet used by officers on the saloon deck. Some of the sinks are troughs with a continuous flush, while others are of the basin, hopper, and trap pattern. They were adequate for the requirements. Defect in basin sinks arose from the fact that there was no automatic flush and not enough water pressure to keep trap clean, so tha it became necessary to discontinue the use of some of them. Trough sinks with direct outlet were very satisfactory, but there was hardly enough slant in some the drop being no more than about 1 in 16. This necessitated constant attention to prevent accumulations. Portholes were the only means of ventilation, and a it became necessary at times, on account of a rough sea, to keep them closed, th outlet at such times was through men's quarters, and even when portholes wer open this could not entirely be prevented. It was obviated as much as possible by the plentiful use of water in the troughs, allowing no accumulation o excreta, and by the use of deodorizers and disinfectants, principally chloride o lime. This could probably best be remedied by a system of exhaust ventilatio pipes connecting with smokestack.

Lighting effected by incandescents.

Inspection of quarters and sinks was made twice a day by a medical officer. Me were inspected once a day concerning personal cleanliness and for the purpose o detecting disease. Every man was required to take a bath every second day, bedding being aired at such time. Shower baths and canvas bath tubs were provided for bath purposes, the latter proving somewhat uncleanly. As there was quite number of cases of venereal disease among the men, there was some danger of transmission and of eye infection. Shower baths are therefore to be preferred; bathing and washing of clothing allowed only on the upper deck.

Food was on the whole very good: no complaint was heard from the men. There was a sufficient quantity, and the quality and variety were as good, if not better, than the ration provided in the field. The ration was composed of dried vegetables, fresh beef, pork and bacon, salmon, bread, canned tomatoes, coffee, etc.; system of cooking for all the men together apparently a very satisfactory one. There was no evidence of scurvy or any disease arising from improper food.

Number of men on sick report about the same as in garrison, notwithstanding the sudden transition from garrison life, which necessarily involved a change of food, change in the manner of living, a lack of exercise to which the men were accustomed, and the somewhat depressing influence of so long a journey. Space allotted for hospital consisted of one small room on upper deck, 12 by 14 and 7 feet high, with a dispensary just large enough to store medicines for immediate use. This was found to be inadequate. It became necessary to provide another place for a number of cases of measles. It was somewhat difficult to obtain a place where these cases could have some degree of isolation. It was also desirable to have some place to do minor surgery and the clerical work.

Thirteen cases of measles and one of typhoid fever were treated. Origin of the measles traceable to transport, as the first case occurred about twelve days after boarding vessel (corresponding to the usual period of incubation), and as there had been an epidemic of measles during previous voyages and no previous case among troops; also no history of outside exposure. Patient with typhoid fever was taken sick after the vessel had been at sea for about three weeks, so it is somewhat difficult to determine source of infection in the case. No casualty during the voyage.

On arrival in Manila Bay the cases of measles were transferred from this transport to a hospital in the city and the case of typhoid fever to the hospital ship *Relief*. Provision was made for the disinfection of all bedding and linen infected by these cases, and the attention of the port sanitary officer was directed to the need for disinfection of the mattresses and bedding belonging to the transport and of the woodwork in hospital cabins and bunks to prevent contagion on subsequent voyages.

In the case of the *City of Para*, which left San Francisco July 13, 899, having on board 45 officers and 975 enlisted men, the surgeon, Capt. Charles E. B. Flagg, assistant surgeon, United States Army, on July 18 invited the attention of the commanding officer to the unsanitary condition of the lower berth deck. His report was practically a protest against overcrowding. A board consisting of Maj. Henry Wygant, Twenty-fourth Infantry, and Lieuts. P. C. Fauntleroy and Basil H. Dutcher, assistant surgeons, United States Army, was appointed to examine and report upon the condition of the quarters and to make recommendations having in view the welfare, comfort, and safety of the men. The report of this board, dated July 20, 1899, is as follows:

The enlisted men of this command number, according to the morning report, 76. Their sleeping quarters are divided as follows: A certain number of the noncommissioned officers and a few privates are quartered in the staterooms abaft the main saloon, one man being apportioned to a berth. Concerning these quarters the board has no criticism to make. The remainder of the enlisted men, with the exception of the hospital corps, to be hereafter mentioned, are quartered on the berth deck, an apartment extending from the forehatch through the entire length and breadth of the ship to the bathrooms and closets for the officers in the extreme stern. This deck is near the level of the water, having above it the hurricane and saloon decks. It is to the unsanitary condition of this place that the board desires to invite particular attention.

Provision is made on this deck for the accommodation of 945 men and their entire personal equipment, including blankets, knapsacks, guns, and ammunition, by canvas bunks in tiers of three, running fore and aft, no special provision being made for arms and equipment.

The total capacity of this compartment is about 82,586 cubic feet. From this number there must be deducted the following quantities, determined by careful measurement: For the engine house, 13,296 cubic feet; for various shafts, 738 cubic feet; for bunk timbers, 482 cubic feet; total, 14,516 cubic feet; leaving a total air space of 68,070 cubic feet in which to house 945 men and their equipments. In making these calculations outside dimensions are alone considered, and no deduction was made for stanchions, braces, the donkey engine, staircases, and other solid bodies of more or less magnitude, the determination of whose volume would have occupied more time than the board had at its disposal. Dividing the total air capacity as determined by 945, the number of berths, gives as a quotient 72 cubic feet of air space provided for the accommodation of each enlisted man and his accouterments on a voyage of four weeks through the tropics in a season of expected storm and rough weather. From this space must be deducted the displacement of the man and his equipments, approximating 5 cubic feet, leaving 67 cubic feet of air at his disposal for respiratory purposes.

During that part of the voyage already passed not two-thirds of the berths on this deck have been occupied at night by the men assigned to them, nearly one-third preferring to sleep on the hard upper deck and the remainder being kept above on guard or other duty. In addition to this diminution in the matter of occupants below that evidently expected, the ports or deadlights on the sides, numbering 42 and having a total area of rather less than 15 square feet, have been opened when the weather has permitted, and two wind sails have poured a considerable volume of air below through the constantly open hatches. The weather has thus far been fairly cool; there has been no rain, and the sea has been smooth.

It would seem to the board that these conditions are as favorable for the maintenance of a pure air supply on this deck as can be secured. Yet, in spite of these favorable conditions, the air in this apartment, by actual observation by members of the board, becomes at midnight hot, stagnant, and foul and before daylight is loaded with organic emanations from the lungs of the sleeping occupants to such a degree as to render it almost intolerable. Already men have applied to the hospital requesting permission to occupy it, badly situated as it is, rather than swelter in their assigned quarters.

If under the present favorable conditions this state of affairs prevails, how much worse will the air become when by reason of foul weather the ports and hatches must be closed and rain drives those upon deck to seek shelter below? In the opinion of the board these contingencies are not only possible but are extremely probable during the course of this voyage; and if they do prevail, not only must serious discomfort and distress ensue, but there will be added great danger to health and life. Already the effects of this air poison are becoming manifest at sick call, and one case of acute lobar pneumonia has occurred.

The policing of this apartment has been carried on in as complete and thorough a manner as the nature of the floor and the small amount of light will permit. But a proper policing of the floor of this apartment is totally impossible short of actual destruction by fire. Its planks are old, sodden, and blackened by the accumulated filth of years; its surface is rough, worn, and splintered, and its wide and gaping cracks are filled with the refuse from its former occupation. Under these circumstances it is totally impossible to remove the organic filth that early accumulates on a voyage of this kind, where soldiers, unaccustomed to the water and seasick in large numbers, crawl into their bunks and, too weak to seek the proper places, discharge the contents of their stomachs over the floor in their immediate vicinity. Owing to the wet condition of the outer passageways above, which have to be used by the men as bath houses, passageways, and dining rooms alike, water is constantly carried to this floor on the shoes of the men, and this, with that which enters even in this smooth weather through the open ports, mixed with the filth upon and in the floor makes a black and slimy mud which it is impossible to remove completely with the means at hand in spite of the best intentions of those charged with this duty. To drench this surface with water in efforts to cleanse it renders matters worse by further soaking the floor, and owing to the crowded condition of the bunk timbers and the roughness and irregularities of its surface no efficient system of flushing can be practiced. It is feared that under the conditions of heat and moisture soon to be encountered the condition of this floor, by furnishing a constant supply of decomposing organic matter, will prove a factor of no small importance in the production of sickness among the men.

According to all the reports the season in which this voyage is being made is one in which heavy weather is to be expected, under which circumstances it may become necessary to confine the entire enlisted strength below. Under these circumstances the ports and hatches will have to be closed and the men forced to resort to the berth deck, the passageways upon the saloon deck above being entirely inadequate to hold them, were they in a condition to do so. On the contrary however, not only are these passageways inadequate to accommodate a thousand men, but their floors are deep with a black and greasy slime, the combined result of the salt water used for bathing and flushing, the food materials unavoidably spilled thereon as the men jostle back and forth in their efforts to obtain admission to the galley to procure their meals, and the wood fiber torn from the water-soaked planks by the ceaseless traffic. Occupation, therefore, of these passages, except while en route from above or below or while waiting for meals, is totally impossibly. Furthermore, upon this deck are situated the hospital, all the galleys, the ice machine, the eating and sleeping apartments of the ship's crew, the officers' saloon and dining room, and all the water-closets, rendering its permanent occupation by men totally impracticable.

Taking all these circumstances into consideration, the members of this board are fearful not only of the possibility, but of the extreme probability, of the occurrence of much sickness among the men during the remainder of the voyage. And if, indeed, any great amount of actual sickness be escaped, the board is of the opinion that the depression of the vital forces of the men consequent upon the occupation of this confined space and the breathing of its foul and contaminated air supply will be a serious menace to their future health in the region to which they are bound, rendering them more than ever liable to the contraction of those tropical diseases to which even the robust and vigorous are too liable to fall victims.

Were the worst fears of the officers of this board to be realized and any considerable amount of sickness to prevail, the conditions under which these patients would have to be treated are a source of considerable anxiety to the medical officers of the transport. The hospital is a small and dark compartment, holding 12 berths, situated in the waist of the ship and without outside ventilation of any kind. The doors, one at each end, open into passageways along the ship's sides, which would have to be closed by swinging hatches in rough weather and which afford but little light and air under the most favorable conditions. As an annex to this hospital there are under the control of the chief medical officer three staterooms, one below and two on the hurricane deck. But so far from being available for the use of the sick, the crowded condition of the ship is such that the hospital corps is itself berthed in the hospital. Its disposition in detail is as follows: In one stateroom above, holding three berths, one acting hospital steward and two privates; in the other, holding also three berths, two privates and a ship's butcher, a civilian; in the stateroom below, holding two berths, two acting hospital stewards; in the main hospital, one acting hospital steward, seven privates, and four patients. It will be seen from the above that every hospital berth is occupied, and necessarily so, with but four men sick in hospital. Toward morning the air in this hospital becomes stagnant and foul, while the electric fan, which can be run only while the electric light is burning, serves merely to agitate but not to remove it.

With regard to the inadequacy of lifeboats and rafts, the board finds the facts as stated in the letter of Captain Flagg, but refrains from making any recommendations thereon, in the belief that this danger is one that does not directly concern the sanitary officials of the transport, nor is it one of which we as soldiers can take cognizance.

After mature deliberation and a thorough examination of the conditions enumerated and described, and after considering all the circumstances of this case in every light in which they could be viewed, the board has arrived at the following conclusions, which it begs to submit to the attention of those in authority:

1. That the number of enlisted men present upon this transport is too great by at least one-third to be housed with safety to health under the most favorable meteorological conditions.
2. That under the conditions of weather that will probably prevail the entire enlisted strength may at any time be confined below for a considerable period.
3. That if these conditions of unfavorable weather are met and the men are confined below, much suffering and sickness will inevitably ensue, with perhaps death.
4. That the vital powers and capacity for the resistance of disease of those not disabled by sickness will be so depleted that they will, upon entering the unhealthy regions to which they are bound, be far more liable to fall victims to the diseases of the tropics than they would were they traveling under proper sanitary conditions.

The board therefore, in consequence of the above observations and conclusions, respectfully recommends the following measures which, in its opinion, are necessary to insure the health and safety of the enlisted men of this command:

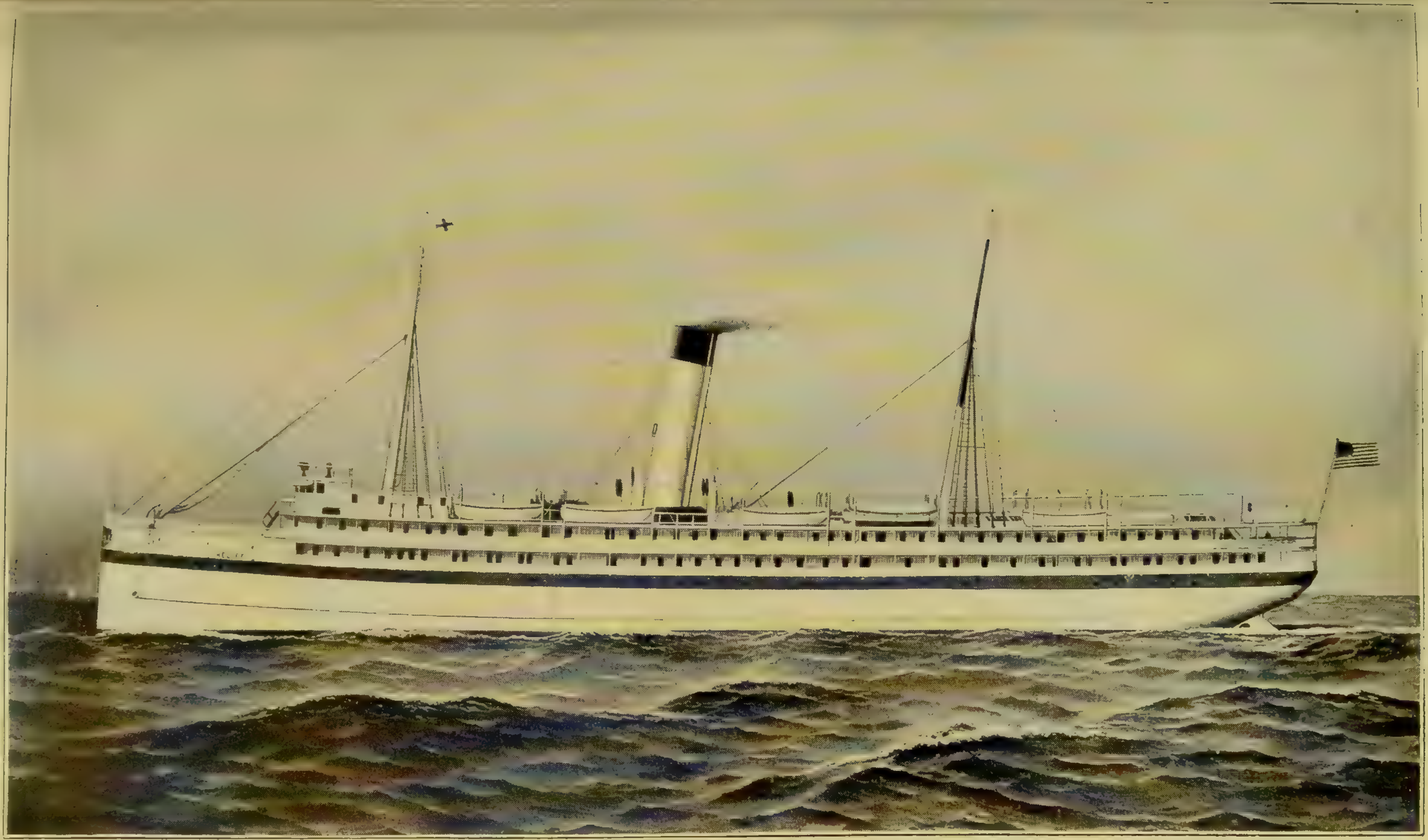
1. The continuation of the stringent sanitary measures now being observed.
2. The disembarkation at Honolulu of at least one-third of the command.

In conclusion the board desires to emphasize its concurrence in every particular with the findings and recommendations of Capt. Charles E. B. Flagg, chief surgeon of the transport, as given in his letter of July 19, 1899, to the transport adjutant; and the board further desires to express the opinion that every measure is being taken by those in authority to preserve the health of the men in the ship and to counteract the effects of their overcrowded condition in a place wholly unadapted for the quartering of troops during a long voyage.

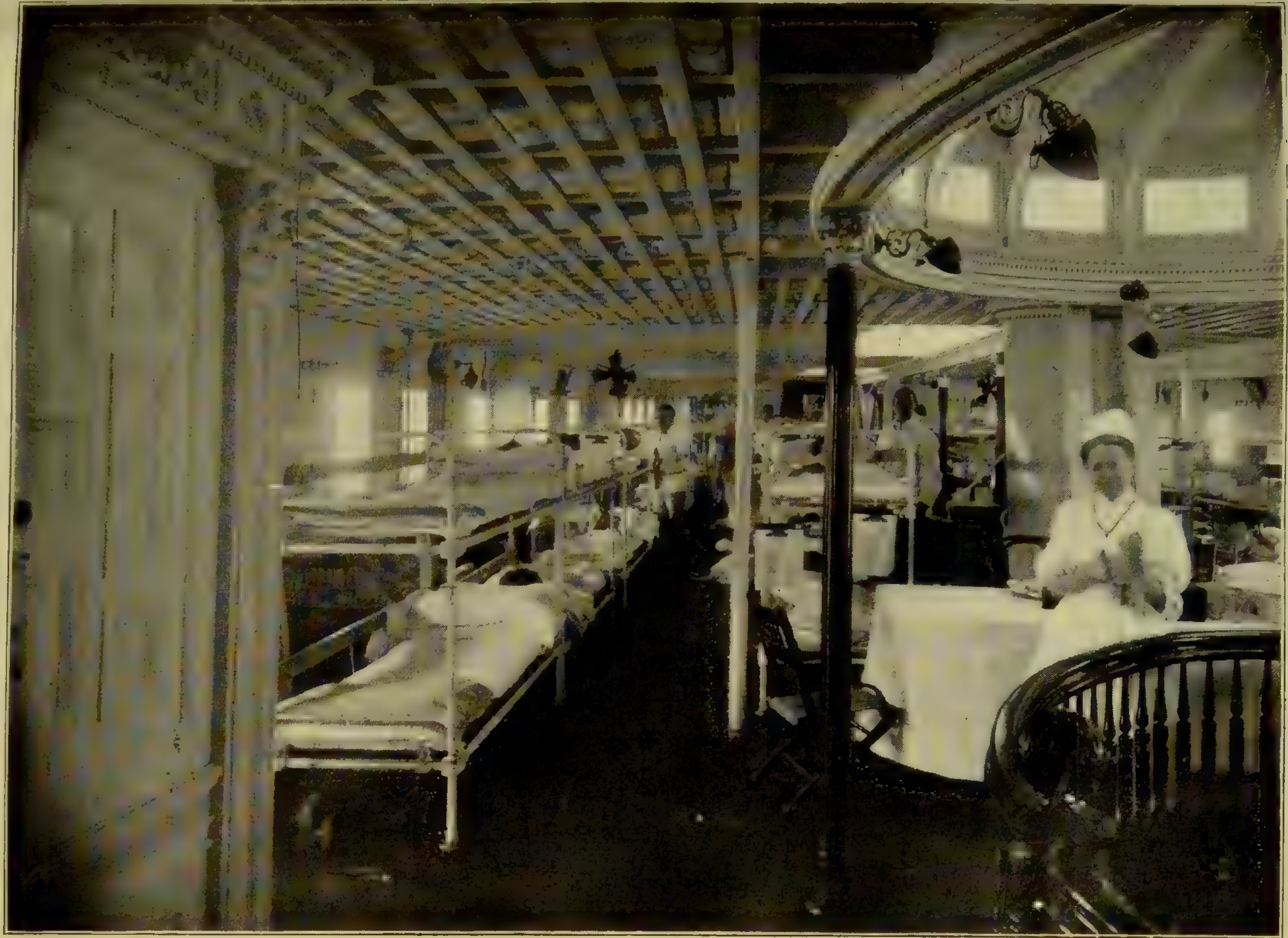
HOSPITAL SHIPS.

The Relief.—As stated in my last annual report, the steamship *John Englis* was purchased May 18, 1898, with a view to converting her into a hospital ship. I considered this vessel well adapted for the purpose. She was intended to act as a floating hospital for the care of the sick and wounded at any point on the Cuban coast, to transport them to the United States, and to be at the same time a depot of reserve medical supplies for our invading army. As early as April 23, I had recommended this purchase in consideration of the need for such a ship and of the time which would be required to effect the alterations necessary to fit her for her special service. She was a new vessel, having been built in 1896 at Chester, Pa., for passenger traffic between New York City, N. Y., and Portland, Me. Every effort was made by this office to hasten the preparation of the vessel for service, but the work of the Quartermaster's Department in fitting her up for hospital purposes took more time than was anticipated, and not until July 2 was she prepared to steam out on her first voyage as the hospital ship *Relief*.

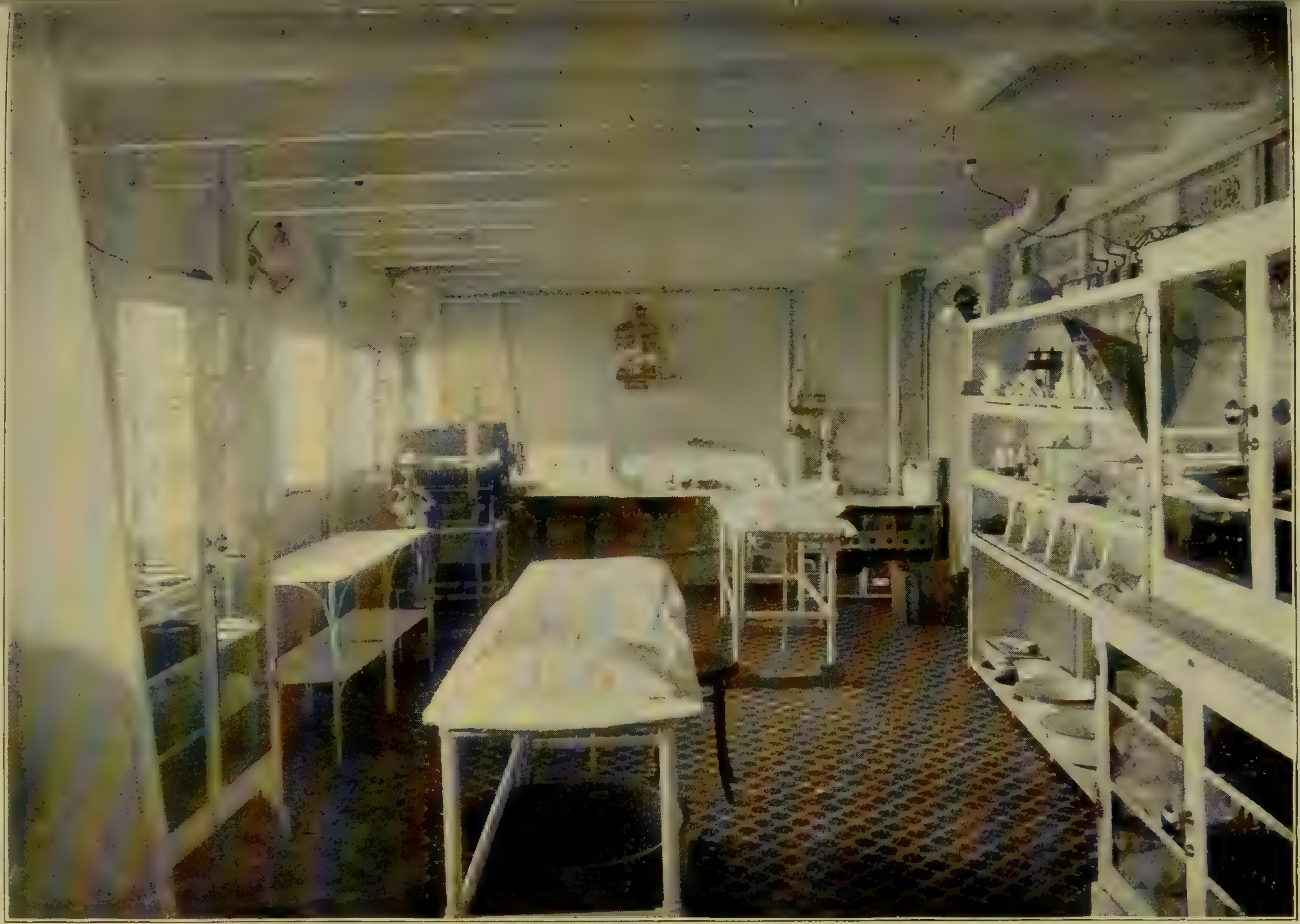
This vessel is 306 feet in length, 46 feet in breadth of beam, and 29 feet in depth from the level of the main deck. There are five wards, each with water-closets and bath and mess rooms adjoining. All are painted white throughout with the exception of the floors, which are chocolate brown. They are well ventilated and lighted at night by electricity. The iron bunks are double tiered and placed fore and aft in two lines on each side of the wards, leaving commodious lengthwise and transverse passages between them. Ward No. 1, on the after part of the upper deck, 68 feet long, 32 feet wide in its broadest and 24 feet in its narrowest width, contains 76 beds. Ward No. 2, forward on the same deck, 66 feet long, 32 feet wide in its broadest and 24 feet in its narrowest width, has 62 beds. In the center of the midship space between the wards are the engine and the boiler inclosures with, on the port side, the wardmasters' and nurses' rooms, lockers, mess rooms, and water-closets, and on the starboard side the dispensary and the rooms of the engineers and oilers. Ward No. 3, aft on the main deck, 79 feet long, 38 feet wide in its broadest and 28 feet in its narrowest part, has 76 beds. The operating room is partitioned off from the fore part of this ward on the starboard side. Amidship on this deck is the galley and bakery, with the mess room for hospital attendants aft and the mess room for sick officers forward on the starboard side, and the quartermaster's office, clerk's room, laboratory, and dark room, attendants' water-closets, and officers' ward mess room on the port side. Ward No 4, of 30 beds, for officers, 38 by 24 feet, is forward of the midship space. Occupying that part of this deck, between the ward and the forecastle space for the crew, are the quarters, mess room, pantry, baths, etc., of the medical officers and the office of the executive officer. Ward No. 5, 37 feet long, 41 feet wide in its broadest and 36 in its narrowest part, and containing 46 beds, is on the lower deck, with a crew space separating it from the steering engine. On either side of the boiler and engine inclosures are coal bunkers, with the laundry and drying room to port and storerooms to starboard. The forward part of this deck provides space for disinfecting and ice-making appa-



THE HOSPITAL SHIP RELIEF.



AFTER WARD ON UPPER DECK OF HOSPITAL SHIP RELIEF.



OPERATING ROOM, HOSPITAL SHIP RELIEF.

ratus, storerooms, ice box and chill rooms, elevator, steering and windlass engines, staterooms, water-closets, and quarters for the crew. On the orlop deck, aft of the engine and boiler rooms, are water tanks and rooms for medicines, medical stores and quartermaster stores, while forward are coal bunkers, a deadhouse, and rooms for commissary stores, flour, vegetables, electrical stores, ship's stores, sails, awnings, and chains. On each side of the hurricane deck are four lifeboats and a 28-foot steam launch, while forward of the funnel are the pilot house and the staterooms of the ship's officers; aft of the funnel are the hatches, skylights, and life-rafts.

The hospital staff consisted of the commanding officer, Maj. George H. Torney, surgeon, United States Army, with 6 medical officers, 3 hospital stewards, 4 acting hospital stewards, 29 privates of the Hospital Corps, 10 male nurses graduated from Bellevue Hospital, New York, and 10 trained female nurses.

This ship has been on active service during the whole of the past year. On her first outward voyage she carried greatly needed medical supplies to Siboney, Cuba, where she arrived July 7, 1898, returning to New York on the 23d with 254 patients. Her second voyage was to Ponce, P. R., whence she returned August 19 with 255 patients. Her third service was again to Ponce, returning to Philadelphia with sick September 6. She then helped to distribute the sick from Montauk Point, L. I., to hospitals in Boston, Mass., and Philadelphia, Pa. On September 17 Maj. A. E. Bradley, brigade surgeon, United States Volunteers (captain and assistant surgeon, United States Army), was placed in command, relieving Major Torney. After four trips to Cuba and Puerto Rico, bringing back sick and convalescents, the vessel was sent to New York Harbor to be put in condition for the long voyage to Manila, P. I. She sailed March 2, 1899, and touching at Gibraltar March 13, at Port Said March 19, at Perim March 24, at Colombo March 31, and at Singapore April 6, arrived at Manila April 12. Here she remained for over two months, doing excellent service as a floating hospital. All patients are said to have improved remarkably, the beneficial results being credited to the cool air of the bay, the absence of insects, and the excellent quality of the diet provided for them. During this time many interesting cases were examined by the X-ray apparatus.

On June 22 the *Relief* left Manila with 250 patients en route for San Francisco, Cal. She touched at Yokohama for coal and was delayed there by severe storms for several days. While in this port she was visited by many government officials, officers of the Japanese, Austrian, and German navies, and civilian medical men, all of whom made favorable comment on the vessel and her equipment. At Honolulu, also, the vessel received much attention. Fresh fruit, vegetables, and flowers were sent to the sick and carriages to take them driving.

On his arrival at San Francisco, Cal., August 2, 1899, Captain Bradley, in a special communication, represented to me the unsuitability of the *Relief* for the transportation of sick across the Pacific and the excellent service which she was capable of rendering in Philippine waters. This communication read as follows:

U. S. A. HOSPITAL SHIP RELIEF,
San Francisco, Cal., August 6, 1899.

SIR: I have the honor to state, as mentioned in my last monthly report, that I do not consider it wise to continue the sending of the *Relief* between Manila and San Francisco. She has a small coal capacity and reached Honolulu with only one day's supply on board. The weather had been good from Yokohama and the passage was made in good time, the speed being conservative as regarded coal consumption.

All available space was given up to coal, which was put in sacks and distributed between decks after filling all bunkers. The coal, I understand, was not of the best quality, and better speed could have been made if the vessel had not been somewhat foul from tropical waters. The margin of coal excess is so small that, in making repeated trips, sooner or later storms would be encountered, which would so delay us that the fuel supply might be exhausted before port could be reached.

The vessel, too, is not properly constructed to endure the severe storms which prevail in the east. Should a typhoon be encountered at sea, it is quite likely that all the upper portion of the vessel would blow away, and it is in this portion that all the sick are carried.

This very construction, however, makes her admirably adapted for hospital purposes, as plenty of light and air gain free admission to the wards.

I believe we were doing our greatest service as a floating hospital in Manila Bay. Patients did well on board, and many were sent back to duty apparently cured during the two months we lay in the bay. While we sailed with a ship full of patients, all considered too ill to stand transportation on transports, in view of the experience of this trip, I am convinced that all the patients we carried, with but few exceptions, would probably have done well on transports if suitable provision could have been made thereon for diet.

Immediately on approaching cooler temperatures patients began to improve, and even when Japan was reached many were well on the road to recovery. At Honolulu nearly every one was well enough to be given shore liberty.

The comparatively small number—250—which we can carry renders the expense of the journey per patient very great, as there is probably not a great difference in the actual running expenses of this vessel and that of a transport which accommodates three or four times as many men.

The vessel was built for New York and Portland passenger service for short runs, and I now believe if she is still to be employed in carrying patients her proper sphere of usefulness is in the Atlantic, between the United States and the West Indies.

I feel we can do great good at Manila as a hospital, and I believe our work there was satisfactory to the chief surgeon. At his discretion cruises for short periods to Japan might be instituted with a shipload of sick for recuperation. The sea air and cooler weather would be of much value to the men, and I believe many could be restored to duty without coming to the United States.

I, therefore, in view of my present knowledge, recommend that when the *Relief* reaches Manila again she be put in some such service, and that she be not required to carry patients across the Pacific.

Very respectfully, your obedient servant,

A. E. BRADLEY,
Major and Brigade Surgeon, U. S. V., Commanding Relief.

The SURGEON-GENERAL UNITED STATES ARMY,
Washington, D. C.

On August 26, 1899, Captain Bradley was succeeded in command of this hospital ship by Maj. H. O. Perley, surgeon, United States Army, and one month later, September 26, the vessel left San Francisco, Cal., for Manila.

The Missouri.—The services of this steamship and her crew were generously offered to the Government by Mr. B. N. Baker, president of the Atlantic Transport Line, July 1, 1898. This offer was accepted, and the vessel was sent to New York to be repaired, altered, and refitted. She is 320 feet long, 40 feet beam, and 29 feet 6 inches molded depth. Her between-deck space is 7 feet 3 inches, which gives good room for hospital accommodations. She carries about 380 tons of fresh water in her ballast tanks, besides having large condensers. She has triple-expansion engines and a speed of about 11 knots. In outfitting her for hospital purposes a steam laundry, steam sterilizing apparatus, and ice and carbonating plants were provided. Maj. William H. Arthur, surgeon, United States Army, who was placed in command, still continues to hold that position.

On her first voyage this vessel relieved the hospitals at Santiago,

THE HOSPITAL SHIP MISSOURI.

Cuba; on her second and third those at Ponce, Puerto Rico. She carried in all on these three trips 704 patients. Her next service was between Savannah, Ga., and Havana, Cuba. On the second visit to the latter place she remained for two months on duty as a floating hospital.

Her gratuitous service on the Atlantic coast ended early in May, when she was purchased by the Government and sent to Brooklyn, N. Y., to be put in thoroughly good condition for duty in connection with military operations in the Philippine Islands. She sailed for Manila by the eastern route September 30, 1899, with a medical staff consisting of 4 medical officers, 2 acting assistant surgeons, 2 hospital stewards, 7 acting hospital stewards, 47 privates of the hospital corps, 11 contract nurses (male), 1 chief cook and 4 assistants, 1 laundryman, and 3 cabin boys. She carried a large amount of medicines and medical and hospital supplies and property, and had on board as passengers 2 medical officers of the Army, 2 hospital stewards, 3 acting hospital stewards, and 149 privates of the hospital corps en route for service with the Eighth Army Corps.

The hospital ship *Aid* was purchased from the Massachusetts Volunteer Aid Association in November, 1898. This vessel, formerly a fruit steamer, had been fitted up at considerable expense by the people of Massachusetts, and under the name of the *Bay State* was reported to have done good work during the previous summer. It was found, however, after a short experience during the occasionally severe weather of the winter months, that her motion in a seaway was such as to render her unsuitable for the transportation of sick. While in New York Harbor getting ready for sea her ice machine exploded, killing 1 man, injuring 11 others, and causing much damage to her machinery. Her first voyage was with medical supplies to Santiago, Cuba, which she reached December 24, 1898. Thence she proceeded to Kingston, Jamaica, and Havana, Cuba, returning to Savannah, Ga., for more supplies January 24, 1899. She was then ordered to Cienfuegos, Cuba, the intention being to use her as a supply ship and floating hospital for posts on the southern coast of the island, but early in March, having suffered considerable damage from storms, her commanding officer, Capt. A. N. Stark, assistant surgeon, United States Army, was directed to take her to Newport News, Va., for repairs. Here she was turned over to the Quartermaster's Department and her hospital property and personnel were carried by the *Missouri* to Havana, Cuba, to be used in outfitting the transport *Terry* as an extemporized hospital ship.

SANITARY REPORTS AND INSPECTIONS.

In view of the difficulty experienced in learning through chief surgeons of corps and departments the sanitary condition and sick rates affecting individual regiments in the field, temporary garrisons, and detachments, I called, in General Orders, No. 194, Adjutant-General's Office, December 31, 1898, on medical officers serving in the field or at temporary stations for a weekly sanitary report of the commands with which they were serving, these reports to contain a reference only to existing insanitary conditions and to be forwarded through military channels to the Adjutant-General of the Army, after the manner of monthly reports rendered from permanent posts, under Army Regulation 1393. The object of these weekly reports was to obtain prompt action by local authorities on such conditions as lay within their jurisdiction. They effected this object admirably in securing the removal of many faults in the sanitation of camps which would otherwise have had a powerful influence in augmenting the sick lists of the Army.

About the same time Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, was assigned to duty as medical inspector of the Army. His duties were defined in a communication dated December 2, 1898, as follows:

> In the discharge of your duties as medical inspector of the Army you are expected to report to me upon the sanitary condition and wants of troops in the field, at military posts, and in general hospitals, and as regards the skill, efficiency, and conduct of officers, enlisted men, and civilian employees connected with the Medical Department.
>
> You will see that the existing orders and regulations relating to the Medical Department are complied with, and that all prescribed reports and returns are promptly made and forwarded when due.
>
> You will examine into the quality, quantity, and condition of medical and hospital supplies, reporting any failure on the part of responsible medical officers to make proper requisitions and any deficiencies found due to failure on the part of supply officers to promptly fill approved requisitions.
>
> You will ascertain what diseases are most prevalent in the camps visited by you, and will inquire into the cause for such prevalence and the steps which have been taken for the prevention or arrest of any infectious diseases which may exist, indicating verbally or in writing to the responsible medical officers such additional measures or precautions as may be requisite. When sanitary reforms requiring the sanction and cooperation of military authorities are urgently demanded you will report at once, in writing, to the officer commanding the military department, corps, division, or camp, calling his attention to the facts and recommending such measures as you consider necessary for the relief of insanitary conditions existing. A duplicate of such report should be forwarded to the Surgeon-General of the Army.
>
> You will ascertain whether medical supplies are properly used and with a due regard to economy; whether any additional articles not now included in our supply table are necessary for the treatment of the sick; whether the equipment of regimental hospitals is such as is contemplated by recent orders; whether cases of infectious diseases or of soldiers seriously ill are improperly retained in regimental hospitals; whether division hospitals are fully equipped as regards supplies, medical officers, and attendants to properly care for the sick of the command to which they belong, and whether contract surgeons have been examined as prescribed by recent orders.
>
> You will give special attention to diet kitchens and see that they are equipped for providing the sick with suitable diet.
>
> You will ascertain whether a proper use is made of the fund provided for the purchase of suitable articles of diet for the sick, as prescribed in General Orders, No. 116, and whether the Subsistence Department has on hand for sale such articles as are necessary.
>
> You will inquire as to the sufficiency of tents, ambulances, and other articles furnished by the Quartermaster's Department.
>
> You will report any abuses or deficiencies existing to the commanding general of the department, corps, division, camp, or military post, sending a duplicate of the report to the Surgeon-General of the Army.
>
> You will also report upon the professional competence, attention to duty, and general qualifications of medical officers, calling the attention of the Surgeon-General to those who deserve commendation, and also to those who are considered incompetent or for any reason undesirable members of the Medical Department.
>
> You will give special attention to the efficiency of the hospital corps, reporting whether proper discipline is maintained and proper instruction given in all that pertains to the duties of enlisted men of that corps.

In a report by Col. Charles Greenleaf, dated San Francisco, Cal., July 31, 1899, he gives the following satisfactory summary of the conditions observed during his various inspections:

> My first inspection was made between December 6 and December 21, 1898, and had for its principal objects the outfitting of the medical department of the Seventh Army Corps, then at Savannah, Ga., en route for Cuba, and the establishment of regimental hospitals in the various camps throughout the Southern States.
>
> The next inspection was made between January 4 and January 29, 1899, and was

in continuation of the former duty and to examine the transport and medical-supply service at San Francisco, Cal. The next inspection, between February 2, 1899, and March 12, 1899, was to examine the various military stations occupied by United States troops in Cuba, with a view to their sanitary condition, and particularly to determine the fitness of Spanish military buildings for occupancy and to advise as to their disinfection and repair. The next journey was made between March 12, 1899, and May 19, 1899, and was for the purpose of inspecting the general hospitals at Fortress Monroe and Atlanta, the field hospital at Greenville, S. C., the hospital ship *Aid* at Newport News, Va., and the camp at Savannah, Ga., of the volunteer troops returning from Cuba for muster out. The next journey was made between May 22, 1899, and May 25, 1899, to Camp Meade, Pa., to supervise the sanitation of the muster-out camp at that place, and the next, on June 5, 1899, was to perform a similar duty in the Model Camp at San Francisco, Cal.

One of the most noticeable features at these inspections was the improvement in the methods of sanitary administration for the troops that were in camps and in the field. The privy pit had given place to the box system, with dry earth and lime as disinfectants, and at a later date this was in turn displaced by the trough system now coming into general use, with milk of lime as its disinfectant. The excreta in the box system was removed by civilian labor and disposed of either by cremation, by burying, or by fertilizing, and in the trough system it was removed in odorless excavating carts, also under the charge of civilian employees. Urine tubs placed in company streets for night service are coming into general use, avoiding ground pollution of camps. Kitchen garbage and camp refuse are cremated or hauled to distant points, and tents, bedding, and company streets are now policed by details from the troops under regimental orders. These methods have been effective, however, only through the constant vigilance of regimental officers and their requirement of strict obedience to regulations for cleanliness. It has become evident that until the men of our Army have been seasoned by service in the field and have become disciplined soldiers no dependence can be placed upon them for camp sanitation. The untrained American soldier, whether regular or volunteer, will never perform the duty of scavenger except under compulsion; and unless that duty is performed willingly and thoroughly, the troops will suffer from disease. Civilian help was often called on to take the place of soldier labor for this purpose; sometimes it was paid for by voluntary contribution in regiments, sometimes by individuals, and sometimes by the quartermaster's department. This latter method has, by sheer necessity, gradually become universal and should be adopted by official recognition from the War Department.

The personal cleanliness of the men was occasionally provided for by constructing bath houses containing shower baths and requiring a systematic use of them. The lack of facilities for securing personal cleanliness to the soldier is much to be regretted; he has no tub in which his clothing can be washed, no means by which it may be boiled, and little or no means by which his person may be washed. These should all be furnished for his use as a part of the official equipment of the company to which he belongs. As a rule, I found that regimental officers, both regular and volunteer, were not sufficiently alive to the necessity of cooperation with the medical officer in securing health conditions for their men. Medical officers have done their whole duty as the official advisers in sanitary matters, but the officers who should have carried out health measures have too often disregarded this advice and either not followed it at all or have been so indifferent in the matter that their work has been barren of results.

Division and field hospitals were well organized and equipped, although their personnel was in many instances not satisfactory, particularly as to the men of the hospital corps, many of whom were inefficient and untrustworthy, and with the prospect of an early muster out of the services before them, had no interest in their work. This feeling, indeed, extended itself occasionally to medical officers, who performed their duty in a perfunctory manner. The sick were, however, well cared for; female nurses, who were zealous and faithful, and whose professional efficiency was generally assured, rendering valuable service. The equipment of regimental hospitals was somewhat delayed by the disinclination of medical officers to burden themselves with the necessary property responsibility, but at the time the order for their establishment was issued, the division, field, and general hospitals were in good working order and furnished ample accomodations for the sick.

Medical supplies were ample, and in many instances in great excess over the needs of the troops, through injudicious requisition from medical officers, who feared that the exigencies of foreign service might leave them without the necessary material to care for the sick. Occasionally there was delay in filling requisitions from supply depots, notably from the one in New York, but the authorization of local purchases relieved present necessities, and in no case did I hear of suffering from lack of supply.

There was often laxity in methods of dispensing medicines, which were occasionally given to sergeants of companies for issue to the men, or they were given directly to men in quantities sufficient to last a week or more. Hospital stewards and attendants were often dispensers. Investigations on this line showed that the men often threw away medicines thus given to them, and this may account in a way for the excessive issues during the war to troops in the field. Stringent orders requiring medical officers to personally attend to this important part of their duties brought about an improvement, although even at this late date instances of neglect in this particular are to be found. Complaints were made regarding the official allowances on the supply table, both as to variety and quantity, and in some respects they were well founded. Recommendation for a revision of this table, especially with reference to use in the tropics, was made to the Surgeon-General, and a board for this purpose is now in session in Washington, D. C.

The care of hospital records was much neglected and it was a difficult matter to induce volunteer medical officers to acquaint themselves with this part of their duty. It was not until a stoppage of pay at muster out was in prospect that its importance was realized, and then efforts were made to supply missing data. This was measurably successful, but at the best a majority of the records of volunteer regiments are incomplete. Professionally, however, the medical officers were as a rule competent.

A general disregard of the law and regulations governing the use of ambulances was found to prevail, these vehicles being used for other purposes than those for which they were supplied to the Army. Prompt report of the fact was made to Washington, and in some instances the abuse was checked, but it still continues in many places.

The food supply of the Army has been excellent in quality, ample in quantity, and generally of sufficient variety. Where defects existed they have been quickly reported and promptly remedied. The cooking has been fairly well done, and a steady improvement is noticeable in the skill of company cooks in preparing food. For troops serving in the tropics a change in the components of the ration is desirable, by increasing the quantity of starchy foods, such as rice and beans, and diminishing the quantity of pork and fresh beef. Bacon seems to be acceptable in all climates. In hospitals the 60-cent allowance has enabled medical officers to purchase freely of every article of food desirable or necessary for the sick. The management of this fund has varied much with the individual capacity of the medical officer for administration; in many cases the entire fund has been expended, but in the majority of instances not more than two-thirds of the sum has been required. The present allowance of 40 cents will doubtless supply all the requirements in this particular for a well-regulated hospital, although in some localities, where market prices are high, a larger sum will be necessary.

DISPOSAL OF EXCRETA IN CAMPS.

The epidemics of typhoid fever which prevailed in our large camps during the summer and autumn of 1898 had their origin in a want of proper sanitary care for the condition of the sinks or privy pits. I do not mean that the first case in a regiment originated in this way. The infection was usually brought to the camp site with the command from State or muster-in camps. Often the existence of the primary infection was not manifest, as the case was yet in its incubatory stage, and frequently, when developed, it was so mild that its dangerous character was unrecognized. Again, the infection of the first case was no doubt derived in many instances from polluted water used by the men before the general water system of the camp was perfected. The first case, however, having occurred, the privy pit became a center of infection from which the disease was likely to be propagated and an epidemic possibly developed.

The sinks, therefore, were objects of solicitude from the very first. In a circular issued April 25, 1898, I directed the attention of medical officers to the importance of this subject:

[Extract from Circular No. 1.]

Sinks should be dug before a camp is occupied, or as soon after as practicable. The surface of fecal matter should be covered with fresh earth, quicklime, or ashes three times a day.

New sinks should be dug and old ones filled when contents of old ones are 2 feet rom surface of ground.

Every man should be punished who fails to make use of the sinks. * * *

All kitchen refuse should be promptly buried and perfect sanitary police mainained. * * *

The discharges of patients with fever should always be disinfected at once with solution of carbolic acid (5 per cent) or chloride of lime (6 ounces to a gallon of rater) or with milk of lime, made from fresh quicklime. * * *

No doubt typhoid fever, camp diarrhea, and probably yellow fever are frequently ommunicated to soldiers in camp through the agency of flies, which swarm about cal matter and filth of all kinds deposited upon the ground or in shallow pits, nd directly convey infectious material attached to their feet or contained in their xcreta to the food which is exposed while being prepared at the company kitchns or while being served in the mess tents. It is for this reason that a strict nitary police is so important. Also because the water supply may be contamiated in the same way or by surface drainage.

Again on August 8, 1898, I recalled the attention of medical officers o the paragraphs just quoted.

[Circular No. 5.]

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, August 8, 1898.

The attention of medical officers is invited to Circular No. 1 from this office, ated Washington, April 25, 1898.

The extensive prevalence of typhoid fever in camps of instruction indicates that he sanitary recommendations made in this circular have not been carried out. medical officers have failed to make the proper recommendations as indicated, he responsibility rests with them. If the recommendations have been made and ot acted upon by those having authority in the various camps, the responsibility not with the Medical Department, but these recommendations should be repeated nd commanding officers urged to move their camps at frequent intervals and to aintain a strict sanitary police.

GEORGE M. STERNBERG,
Surgeon-General.

On September 5 I considered it advisable to make special publicaon of certain paragraphs of the Manual for the Medical Department, hich give specific directions for dealing with infected sinks and esspools:

[Circular No. 7.]

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, September 5, 1898.

The attention of chief surgeons and of all medical officers on duty with troops the field is called to the following paragraphs from the Manual for the Medical epartment:

"92. When accumulations of organic material undergoing decomposition can ot be removed or buried, they may be treated with an antiseptic solution or with eshly burned quicklime. Quicklime is also a valuable disinfectant, and may be bstituted for the more expensive chloride of lime for disinfection of typhoid and olera excreta, etc. For this purpose freshly prepared milk of lime should be sed, containing about 1 part, by weight, of hydrate of lime, to 8 of water.

"93. During the prevalence of an epidemic, or when there is reason to believe hat infectious material has been introduced from any source, latrines and cessools may be treated with milk of lime, in the proportion of 5 parts to 100 parts of he contents of the vault, and the daily addition of 10 parts for 100 parts of daily ncrement of feces."

Quicklime should be purchased in such quantities as may be necessary for the urpose of carrying out these instructions, and vouchers sent to the Surgeon-eneral of the Army for payment from the medical and hospital appropriation.

GEORGE M. STERNBERG,
Surgeon-General.

As we now know the cause of typhoid fever, the biological characers of its bacillus, and the physical and chemical agencies by which may be destroyed, I had hoped that by making practical use of this knowledge we would have been able to avoid any great losses from this disease. That this hope was not realized I attribute to the inexperience of regimental medical and line officers in sanitary matters and the want of discipline among the men. The medical officers of regiments were appointed by the governors of States and as a rule were competent professionally, but they were called upon to assume new responsibilities, for which they had no special training. Unfortunately, hygiene and practical sanitation are subjects which receive little attention in our medical schools or from physicians and surgeons engaged in the practice of medicine. But even in those cases in which the regimental surgeon was fully aware of the importance of camp sanitation and urgent in his sanitary recommendations, he was unable to control the sanitary situation unless the regimental and company officers enforced the necessary measures for protecting the health of the command.

The officers and enlisted men of our volunteer regiments were, as a rule, intelligent, patriotic, and brave, but they were not disciplined. Trained officers can not at once establish discipline among untrained troops; and when both officers and enlisted men are without military experience, it is evident that, with the best material, time will be required for the establishment of discipline. And in the absence of discipline it is impracticable to enforce proper sanitary regulations in camp. The Surgeon-General may formulate sanitary regulations, and the general commanding an army corps or a division may issue the necessary orders, but in the absence of discipline these orders will not be enforced. A reckless recruit will drink the water which has been condemned as unsafe, and at night will defile the ground in the vicinity of his tent rather than visit the company sink, which possibly is in a disgusting and unsanitary condition because of a failure to carry out the orders to cover the surface of excreta "with fresh earth or quicklime or ashes three times a day."

The difficulty in controlling the sanitary situation, even when under the supervision of an experienced medical officer of the Regular Army, is illustrated by the following extract from a personal letter to me, referring to one of the camps occupied by volunteers who had returned from Cuba to be mustered out of service. The writer, Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, says:

> I have never had a more trying time than during the past two weeks in efforts to keep the camps reasonably clean. The approach of the muster-out period made officers and men equally indifferent to ordinary cleanliness, and without the co-operation of the quartermaster their camps would have been quickly untenable. We have had to hire civilians to clean the latrines—remove their contents, the garbage—clean the camp streets, and finally to stay on duty at the latrines and cover excrement as it was deposited. Orders, written and verbal, requiring the soldiers to do anything in the way of police were repeatedly issued, but were totally disregarded, and the sinks and kitchens were soon infested with such swarms of flies that I felt sure there must be an outbreak of disease.

During the movements of an active campaign, when a camp site is abandoned after an occupation of a few days, well cared for privy pits afford a simple and satisfactory means of disposing of the excreta of the command. When, however, the camp is one of some permanency, as is usual with camps of organization, recuperation, muster, or territorial occupation, the danger from the use of this primitive system of conservancy is proportioned, other things being equal, to the size of the command and the duration of its continuance on the same ground. With cases of typhoid fever, dysentery, or camp diarrhea among the troops, the pits become foci of infection, which make their influence felt throughout the whole of the camp. Disinfectants may and should be used, but experience has shown that a prompt and complete disinfection in these pits is difficult to carry out and requires the most constant and intelligent supervision.

To preserve the health of the men in these camps it is necessary to disinfect and remove the excreta. This is best effected by a sewerage system. The objection to this is its cost. Without a dearly bought and recent experience of the frequently disastrous results of a penny-wise policy, this question of cost is one which usually meets with much consideration, but the value of the object in view should be equally considered. The first cost of a complete system of sewers for a camp which is to be occupied for several months would be small compared with the expense resulting from an epidemic of typhoid fever, yellow fever, or cholera. It may be safely said that the expense resulting from the large number of cases of typhoid fever in our camps during the past summer has been greatly in excess of the cost of a system of sewers where this would have been practicable, or of some other efficient method of disposing of excreta.

I am of the opinion that to avoid disaster in such camps and as an economical measure, money should be expended freely in their installation. I am confident that when a pure water is brought in, as it should be, in quantity to supply bath houses as well as kitchens and quarters, it would be a wise policy to make provision for the removal of the impure, used, and waste water and to utilize this discharge for the removal of the excreta of the command.

In the sanitary evolution of the military posts in our Western Territories the privy pits, which were dug on the establishment of each post, gave place in time to the system of dry-earth closets. The privy pits were filled up and renewed, in some instances for twenty-five years, without detriment to the health of the garrison, because the command was small and the available area extensive. Ultimately, however, the post became surrounded by mounds of disused pits, and if it was not in the mean time abandoned the dry-earth method of removal was instituted as the best substitute for a water-carriage system. In view of this record, it appeared to me that if in the somewhat permanent camps of a more active military period of our national existence there was objection on the ground of expense, or otherwise, to the construction of sewerage systems, a method of disinfection and removal of the disinfected accumulations might be used to advantage. I therefore, on October 31, 1898, addressed the Adjutant-General of the Army in the following terms, with the view of improving the sanitary condition of the camps then in progress of establishment in the Southern States and of those expected to be soon established in Cuba:

> As the best alternative where a camp is not to be occupied long enough to justify the establishment of a complete system of sewers, or where for any reason this is impracticable. I would suggest the following method of disposing of excreta: I would provide a sufficient number of cylindric galvanized-iron receptacles, 18 inches in diameter and 18 inches deep, provided with a galvanized-iron cover and having a trough around the outside of the vessel 3 inches deep, for the purpose of containing a disinfecting fluid, in order that when the cover is in position this may serve as a valve, preventing the entrance of flies or the escape of foul odors. A second cover of metal, having a proper aperture to serve as a privy seat, should be provided. When about to be used the closed cover would be removed from the iron receptacle, leaving the seat exposed. After use the cover should at once be replaced. These cylindric vessels could be partly filled with a solution of carbolic acid, or the contents could be treated with quicklime, dry earth, or ashes. They should be removed at regular intervals and the contents emptied into a pit

far removed from the camp, or disposed of by cremation. There should be a sufficient number of these vessels to put a clean one in position when those requiring removal are taken away to be emptied and cleaned. These vessels should be cleaned by the use of boiling water (or by incineration, if practicable).

GEORGE M. STERNBERG,
Surgeon-General.

Meanwhile, as I considered the possibility of some better means of disposing of the probably infected excreta of camps of some permanency not provided with a sewerage system, I submitted the subject to the consideration of a board of medical officers, by whom a trough system, with removal by pneumatic pressure, was recommended. This report was approved by me and the method was published in general orders from the headquarters of the Army. The dejecta are dropped into a trough of galvanized iron, the shape of which presents a curved surface throughout, so as to avoid corners, in which excreta might collect, and to insure perfect emptying and cleaning. The trough is charged with a sufficiency of water in which enough quicklime has been added to make an efficient disinfecting mixture. A urinal discharges into this trough. A closet is provided for sheltering and the whole is arranged for crating and transportation from place to place with the command. The trough, when in use, is emptied by an odorless excavating apparatus consisting of a water-tight tank, having a capacity of 500 gallons, carried on a strongly constructed wagon bed. The pumping cylinder is mounted on wheels and drawn at the rear of the wagons.

This trough system is now in successful use at Camp Meade, Pa., and in the camps established at the Presidio of San Francisco, Cal., for the muster out of the State volunteers returning from the Philippines and for the recruits and new regiments awaiting transportation to those islands. The details of the system are given in the following order:

General Orders, }
No. 170. }

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, September 26, 1899.

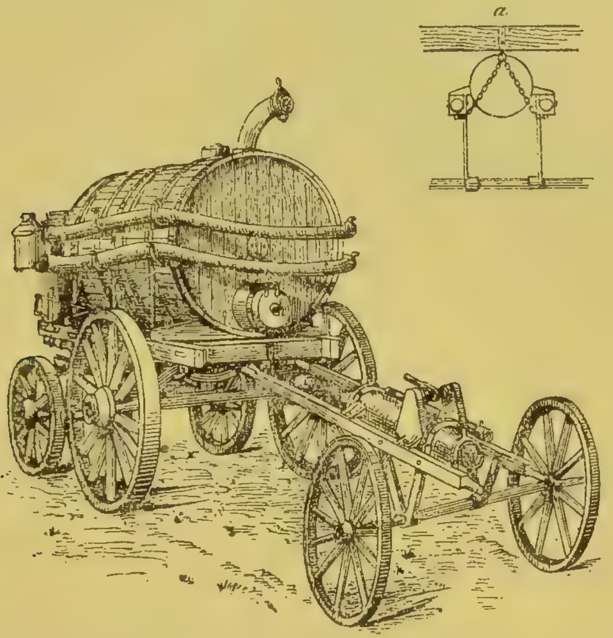
By direction of the Secretary of War, the following description of a system adopted for the disposal of excreta in military camps is published for the information of all concerned:

1. *Description of trough.*—Of the following dimensions: Length, 14 feet; width at top, 22 inches; depth at upper end, 15 inches; depth at lower end, 18 inches, and parabolic in cross section. Material consists of sheets of galvanized iron, No. 22, well riveted and smoothly soldered at joints and end. The front and rear sides of the trough are given additional strength by means of an iron rod one-fourth inch in diameter, over which the edges are turned. The general shape of the trough is such as to present a curved surface throughout, thus avoiding corners in which material could collect, and to insure easy emptying and cleaning of the trough. This trough is supported by a framework consisting of four pieces, so cut out as to accurately fit the surface of the trough. The four frames are placed one at either end of the trough and the other two equally spaced. These frames are joined at the rear of the trough by two pieces, 1 by 4 inches, one of these at the bottom and the other at the top of the frame, the strips running the full length of the trough. In front the trough is completely boarded in by 1-inch material. The lid consists of two sections, each 7 feet long, and each containing three and one-half openings, thus providing seven openings for the trough. This lid is made of 1⅛-inch material, the several pieces of the lid being held together, front and rear, by a batten 1 by 1¼ inches wide. Each section of the lid is provided with four strap hinges screwed at the rear. The ends of the trough are boxed in and give support to a board 1 by 12 inches, rising to a height of 23½ inches in front above the lid of the trough. The upper edge of this board is cut sloping 3 inches. These end boards give support to another board 14 feet 4 inches long by 12 inches wide, and is intended to prevent men from standing upon the lid. This board should also be braced from the roof of the latrine.

It will thus be seen that the trough is inclosed by a complete framework, which is intended to secure support while in use and safety during transportation, should the latter become necessary. When placed in position the height of the upper end of the trough above the floor, including lid, should be 20½ inches. The rear margin of the trough should be at least 4 inches from the studding of the rear wall of the building, so as to permit the raising of each section of the lid.

The lid of the trough is divided into seven spaces, each 1 foot 11½ inches in breadth by 1 foot 10 inches in depth, the sides of the spaces being indicated by a vertical board 4 inches in height and beveled at each end. Each space is provided with an opening so shaped as to prevent as much as possible the soiling of its edges by fecal matter. This opening, 4 by 3 inches in front, expands to a width of 8 by 8 inches, this part having its edges well beveled, and is then extended backward to the rear of the trough and cut away as much as possible without weakening too much the strength of the lid. In other words, both the front and the rear of the ordinary water-closet seat is largely cut away. This is intended to avoid both wetting the front of the seat with urine and its rear edges with precipitate diarrheal discharges.

2. *Description of urinal.*—This consists of a galvanized-iron trough fastened to the end and rear walls of the latrine at a height of 2 feet 6 inches from the floor. It measures 8 feet in length by 8 inches in width, and has a depth of 4 inches. Its rear side is extended 18 inches upward, so as to protect the wall of the latrine from any possible contamination with urine. It has a fall of 5 inches, and empties into the upper end of the large trough by means of a pipe 2 inches in diameter.



Perspective view of Odorless Excavating Tank Wagon with Pump.
The pump is mounted on wooden wheels which "track" with wagon & is attached by chain to rear car.

When ready for use water should be poured into the larger trough until it has a depth of at least 2 inches at the upper end. To this is then added one-sixth barrel of lime and the two well mixed with a wooden paddle. Lime should also be freely sprinkled in the urinal. By this means not only do the excreta immediately fall into a disinfectant solution, but the urine is also mixed with lime prior to falling in the trough. To better provide for the disinfection of the excreta, the contents of the trough should be stirred with a wooden paddle two or three times a day.

3. *Description of latrine.*—This consists of a frame building 8 by 25 feet 10 inches, inside measurements; height of roof at rear, 6 feet 6 inches. The front wall of the building is prolonged 2 feet at either end and is provided with a projecting hood throughout its entire length. This hood protects an opening 20 feet in length by 12 inches in width, which is intended for the ventilation and lighting of the latrine. This opening, in warm climates, should be extended along sides and rear of building, so as to insure a better circulation of air within the closet.

The lengthening of the front wall allows for a protected entrance 2 feet in width at each end of the building for persons, and also for barrels containing the disinfectant.

A door 3 feet 6 inches by 2 feet 6 inches is provided at the end of the closet opposite that of the urinal, through which the hose can be introduced for the removal of the contents of the trough. Through this door also the trough, inclosed in its frame, can be removed whenever this becomes necessary.

The closet is properly floored and should be lighted at night by a suitable reflecting lantern.

4. Description of excavating apparatus.—This consists of (1) a strongly constructed wagon bed supporting a water-tight tank having a capacity of 500 gallons. The wheels of this wagon should have wide tires. A 6-inch opening at rear end of tank, controlled by the turning of a lever, serves for the purpose of emptying its contents; (2) a pumping apparatus, consisting of a cylinder capable of withstanding high pressure, two lengths of 3-inch rubber hose, each 20 feet in length, with two pairs of brass couplings, and removable handle for working the pump. This pump is provided with side bars for lifting purposes, and is supported on a pair of strong wheels, which track with the wheels of the excavator wagon. When in use the pump is connected at each end of its cylinder with one of the ends of the 3-inch hose. One free end of the hose is now to be connected with the pipe on the top of the tank and the free end of the other length of hose placed in the trough to be emptied. The pump is rapidly worked by two men and the contents of the trough quickly pumped into the tank. (A gallon or more of water should be placed in the cylinder of the pump before the connections are made.)

As soon as the trough has been emptied, the end of the hose should be elevated and securely closed with one of the couplings provided for that purpose. This length of hose should now be disconnected from the pump, its end closed with the coupling, and the end of the pump also tightly closed by a valve provided for that purpose. The same steps should be followed in detaching the other length of rubber hose from the tank. In this way none of the contents of the pump or hose are spilled on the ground. The two lengths of hose should next be placed in position along the sides of the tank, the pump hitched to the rear axle of the wagon by the attachment provided; and the excavator wagon driven to the next trough to be emptied.

In camp or on the march this pump should be drawn at the rear of the wagon. Three men should be assigned to each excavating apparatus.

SPECIFICATIONS OF THE MATERIAL AND LABOR REQUIRED IN THE CONSTRUCTION AND CRATING FOR SHIPMENT OF CLOSET AND URINAL TROUGHS, WITH ILLUSTRATIONS OF SAME AND OF ODORLESS EXCAVATING TANK WAGON AND PUMPS.

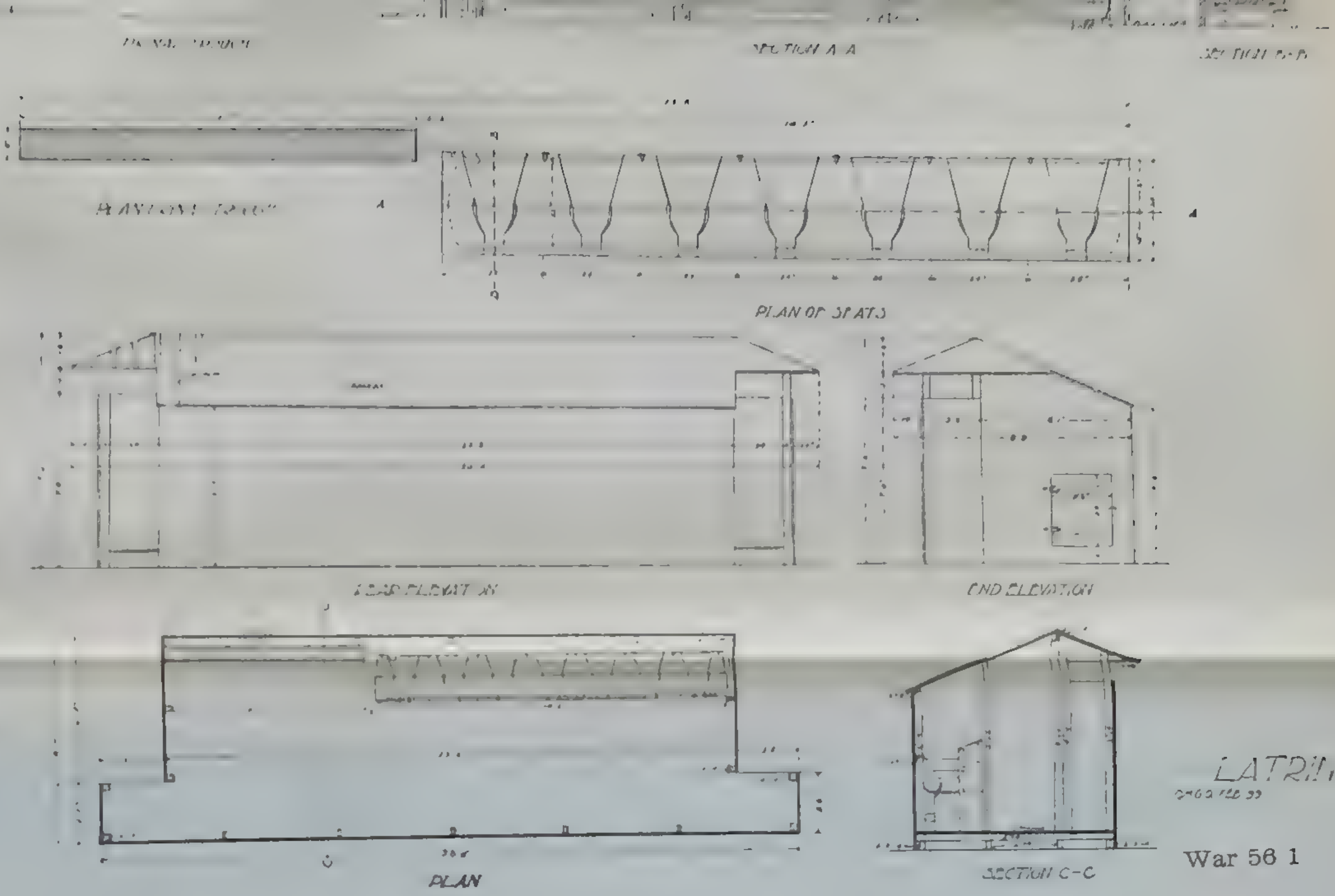
Conditions.—The work is to be executed under the direction and to the entire satisfaction of the United States officer in charge and in conformity with his instructions.

All material will be of the best quality of its respective kind, and all labor is to be done in the most prompt, thorough, and workmanlike manner.

Closet trough.—Closet trough to be constructed of No. 22 best bloom galvanized iron of the following dimensions: Section A–A, length, 14 feet: width at top, 22 inches; depth at upper end, 15 inches; depth at lower end, 18 inches, and parabolic in cross section. Section B–B, the upper edges of trough to be reenforced by means of an iron rod one-fourth inch in diameter, over which the galvanized iron will be turned. The general shape of the trough will be such as to present a curved surface throughout, thus avoiding corners in which the material could collect, and to insure emptying and cleaning of the trough. All joints to be thoroughly riveted and soldered smoothly.

The contractor is to furnish and properly fit the woodwork around trough in a neat, substantial manner; the frame to consist of four 2 by 4 inch ribs so cut as to accurately fit the outer curvature of trough, one to be placed at either end and the other two spaced equally between. These ribs to be tied across bottom strips 2 inches thick and joined at the rear by two 1 by 4 inch horizontal strips, one placed at top and the other at bottom, and extending full length of trough, the front and ends to be completely covered with 1-inch dressed boards. The seat to be made in two sections, each 7 feet 1 inch in length; to be of 1¼-inch dressed boards, cut out as shown, the several pieces of the lid being held together, front and rear, with a batten 1 by 1¼ inches wide screwed on. Each batten of the seat is to be provided with 4-inch strap hinges screwed on at rear.

Urinal trough.—The urinal trough to be constructed of No. 22 best bloom galvanized iron of the following dimensions: Length, 8 feet; width, 8 inches; depth, 4 inches. The lip of trough to be reenforced by means of an iron rod one-fourth inch in diameter, over which the edge will be turned. The rear side is to extend



LATRINE

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upward 18 inches. The end of trough next to closet trough is to have an opening inches in diameter, cut out at bottom, and fitted with a 2-inch outlet neck about ½ inches in length, accurately soldered in. In addition to the above, the con-ractor is to furnish a 2-inch diameter waste pipe, formed of galvanized iron, about 0 inches in length, to slip over outlet neck, with which to empty contents into loset.

Scoop.—Contractor to furnish with each closet trough one retinned open grocer's coop, size 6½ by 10 inches.

Crating.—Each urinal trough, with waste pipe disconnected, and one scoop is to e packed in its accompanying closet trough, and the whole to be properly crated with longitudinal strips of wood in such manner as approved by the officer in harge.

PECIFICATIONS OF THE MATERIAL AND LABOR REQUIRED IN THE CONSTRUCTION OF A TEMPORARY LATRINE.

General conditions.—The work is to be executed under the direction and to the ntire satisfaction of the officer in charge and in conformity with his instructions.

Contractor to furnish all material, labor, etc., necessary to complete the work ccording to the true intent and meaning of the drawings and these specifications, f which intent and meaning the officer in charge shall be the interpreter, and his ecision will in all cases be final.

The location of buildings will be indicated by the officer in charge, and the site will be prepared by the contractor for the reception of the structure, and should e examined by him before bidding. Contractor must lay out his own work cor-ectly, and will be responsible for measurements.

It is intended that the drawings and specifications shall include everything equired for the proper and entire finishing of the building, notwithstanding every em necessarily involved by the work is not particularly mentioned, and all work, when finished, is to be delivered in a perfect and undamaged state.

All timber to be of good quality yellow pine or other good building material uitable to the locality, cost and quality considered, as determined by the officer n charge, free from shakes, large or loose knots, properly spaced and framed ogether.

Building to be supported on two 2 by 4 inch sills, doubled and securely spiked ogether; between these, running longitudinally with building, place 2 by 4 inch ieces, to act as intermediate support for floor joists: all to rest firmly on suit-ble blocking placed under each stud, so as to give a free circulation of air under uilding. Floor joists to be 2 by 4 inches, spaced about 2 feet on centers, and ecurely nailed in place and to studs. Sides, roof, and floor of building to be cov-red with 1 by 10 or 12 inch undressed boards, placed horizontally on sides and n roof running with pitch of same, to be laid with close joints and securely nailed t bearings; joints on roof to be covered with 1 by 3 inch battens.

The roof in front and at ends, where shown, is to form a projecting hood pro-ecting the opening which is intended for ventilating and lighting of the interior.

The length of the front allows for a protected entrance 2 feet in width at each nd of the building for persons and also for barrels containing the disinfectant.

A battened door 3 feet by 2 feet 6 inches is provided at one end of building, hrough which the hose can be introduced for the removal of the contents of the rough. Through this door also the trough, inclosed in its frame, can be removed whenever this becomes necessary.

The door in end is to be hung on suitable strap hinges and provided with hook nd staple: contractor is to furnish all nails and constructional ironwork required r shown.

NOTE.—Closet trough, seats, and urinal troughs, as shown on plans, are omitted rom these specifications, and will be supplied and put in place by the Govern-nent.

By command of Major-General Miles:

H. C. CORBIN, *Adjutant-General.*

WATER SUPPLIES.

Speaking generally of these supplies, I may say that our troops during the past year were amply provided in their various camps with water of excellent quality, and that in no instance was the rapid spread of typhoid fever in a command conceded to be due to infection of the general water supply.

At the outbreak of the recent war the purity of the water supplies for troops in camps of organization or in field service was a subject to which much consideration was given, for the rapid spread of typhoid fever in a community by means of an infected water has been demonstrated so frequently that the water propagation of this fever is a doctrine accepted by all sanitarians.

What was desired for the troops was a sterile water, a water free from all bacterial infections. When the water at a military post was known or suspected to contain sewage, with its possible typhoid infection, it was the custom of military surgeons, immediately prior to the war, to recommend the boiling of the water, with or without a subsequent filtration to aerate it, before authorizing its use as a drinking supply. Boiling destroys the typhoid bacillus and renders the water practically sterile. We have no epidemics of typhoid fever on our naval vessels when at sea, as the men drink condensed water and all sewage is promptly flushed overboard. I understand also that no case of this fever occurred in the battalion of marines during their land service at Guantanamo, Cuba, in 1898. Their water supply was received daily from the ships in the bay. Many soldiers, however, have a distaste for boiled water on account of its flatness. Hence, although a post or camp regulation may require all drinking water to be boiled, it does not follow that all the water used by the men had undergone that process. Moreover, it is difficult without special facilities to provide boiled water for a marching command. Evidently some special method of furnishing a sterile water for the troops had to be devised.

Not long before this a number of filters had been subjected to bacterial test in the laboratory of this office, and a favorable report had been made on the efficiency of the Berkefeld filter. This was a hollow cylinder of compact infusorial earth through which the water was forced by the pressure of a piston, when a sufficient head of water was not available for the purpose. When tested practically by a troop of cavalry on a march of ten days, it was found that if the water to be sterilized was turbid, the fine clay particles constituting the turbidity choked the pores of the infusorial cylinder. Some time later an asbestus filter was submitted to me. This filter clarified a turbid water, but had no value as a sterilizer. It appeared to me, however, that a combination of these two filters might be of value. A preliminary passage of the water through the asbestus would remove the particles of clay and permit the Berkefeld filter to do its work of sterilization without clogging. On my recommendation, this combination was sent to some of the commands for trial. Those sent to Camp Alger were not used because the deep wells sunk about this time in that camp furnished a plentiful supply of pure water. They were afterwards brought into service at Camp Meade, Pa., not because the water there required this filtration, but with a view to familiarize the command with the method of using the filters. Some were used at Chickamauga Park, and a few were seen by my inspectors in company kitchens at Montauk Point. They answered their purpose very well when used intelligently and carefully handled. They were largely employed at those field hospitals which had to make use of surface waters, and occasional mention is made of them in reports from the temporary camps established on the occupation of Cuba. Thus in a report from the camp at Pinar del Rio the statement is made that "the water supply, from a mountain stream, is filtered through Maignen and Berkefeld filters." Or again, in a report from

Adjuntas, Puerto Rico, where the post surgeon refers to the pollution of the water supply by native washwomen, the department commander states that "steps have been taken to provide all the posts in the department with filters." One valuable result of their use by those who possessed them was to lead company officers who did not have them to give greater consideration to the character of their water supplies and to the recommendation of the medical officers when they suggested the advisability of boiling that which was intended for potable use.

On October 31, 1898, in a communication to the Adjutant-General of the Army with reference to the protection of our troops in permanent camps in this country and in the islands at present occupied by our troops from the infectious diseases which are liable to prevail where unsanitary conditions exist, I recommended the use of portable filters in the following terms:

> 1. No camp should be established unless there is an abundant supply of pure water for drinking, bathing, and culinary purposes. Experience shows that reliance upon filtration or upon sterilization by boiling is very uncertain, owing to the difficulty of enforcing the use of the appliances provided for this purpose. Nevertheless, I recommend that portable filters of an approved model be supplied to troops in camp, for use when on the march or under any circumstances where it becomes necessary to use water which may possibly be contaminated by the germs of any one of the infectious diseases which experience has shown to be most dangerous to troops in the field—typhoid fever, cholera, dysentery, camp diarrhea, yellow fever. Company commanders should be made responsible for the proper use of these filters; and as they require frequent cleaning and careful using in order to preserve their efficiency, they should be placed in the immediate care of a reliable and properly instructed noncommissioned officer, who should have a suitable detail to assist him in operating them for the filtration of all water used for drinking purposes.

Some time in August, 1898, Dr. E. D. Shakespeare, of Philadelphia, Pa., as chairman of the committee on sanitation of the National Relief Commission of that city, sent by the yacht *May* to Puerto Rico certain boxes containing outfits for boiling and aerating water for 5,000 men. These consisted of tinned iron caldrons for boiling the water with a rose or bicycle pump or both for subsequently aerating it. Nothing was heard afterwards of these appliances, although at my suggestion special inquiries concerning them were instituted in December, 1898, by the chief surgeon of the department.

Later in December, on account of this failure to learn anything concerning the practical value of the caldrons forwarded from Philadelphia, a board of medical officers, of which Dr. Shakespeare was a member, was appointed to consider and report upon the best method of sterilizing water for troops in the field. The subject was a difficult one, and the report of the board was not received until August, 1899. A method of rapid and economical sterilization by boiling with the apparatus required, which was submitted as the Waterhouse-Forbes water sterilizer, is described and approved by the board. The heat given out by the boiled water in cooling is utilized in heating the entering fresh water. The boiled and aerated water is delivered from the apparatus at a temperature only 4½° F. above that of the entering water.

I have recommended that a number of these sterilizers be sent out for practical test with troops in the field. The subject is fully explained in the report which follows:

WASHINGTON, D. C., *August 18, 1899.*

SIR: The board of medical officers appointed by paragraph 40, Special Orders, No. 194, Adjutant-General's Office, Washington, August 18, 1898, in compliance further with Special Orders, No. 306, Headquarters of the Army, Adjutant-General's Office, Washington, December 29, 1898, paragraph 43, have the honor to submit the following report relating to the sterilization of water for troops in the field. Since the issue of the order last referred to the board has had under consideration a number of apparatus designed by their manufacturers for the purpose of supplying an abundant quantity of pure water for the use of moving troops. Much time has been consumed in waiting upon the several manufacturers in meeting the modifications in apparatus suggested by this board, and this report has been much delayed, largely for this reason.

We deem it unnecessary, from the standpoint of health and diminution of sick rates, to set forth here the advantage of and necessity for a supply at all times of water free from suspicion of any contamination. Although the investigations of this board, now drawing to a conclusion, into the origin and spread of typhoid fever in our military camps during the Spanish war will show that contamination of water, contrary to the usually accepted opinion of medical officers, had little or no part in the propagation of typhoid fever, yet the opportunities for contamination of the water supply must be always kept in mind, as well as the important part which impure water probably plays in the causation of the several forms of dysentery and other intestinal disorders. At the present time, while a large part of our Army is serving in tropical countries, the necessity for an apparatus which will at all times secure an abundant supply of sterilized water is epecially urgent. In order to secure such an apparatus the board has set up the following standard of requirements to be fulfilled by the apparatus submitted:

First. That it shall exclude all living micro-organisms.

Second. That it shall not deprive the water of its natural gases.

Third. That the sterilized water shall approximate closely in temperature to the water entering the apparatus.

Fourth. That it shall not become easily obstructed.

Fifth. That it shall be durable and difficult of breakage in any of its several parts.

Sixth. That it shall be easy of transportation.

Seventh. That it shall remove all coarser particles held in suspension in the water.

Eighth. That it shall furnish not less than 300 gallons of sterilized water in the space of twelve hours.

It will be seen that if these requirements of the board are fulfilled, the result will be an abundant supply of sterile water clear to the eye and presentable to the taste.

The following-named apparatus have been submitted to the board during the past six months and have been given a careful trial:

(*a*) The Berkefeld filter, manufactured by the Berkefeld Filter Company and represented by August Giese & Son, No. 2 Cedar street, New York.

(*b*) The Pasteur-Chamberland filter, manufactured by the Pasteur-Chamberland Filter Company of Dayton, Ohio, and represented by Mr. J. S. Miles, secretary of the company.

(*c*) The Buffalo water filter, represented by Mr. George L. Squier, 419 Niagara street, Buffalo, N. Y.

(*d*) The Maignen water sterilizer, represented by its inventor, Mr. P. A. Maignen, 1310 Arch street, Philadelphia, Pa.

(*e*) The Kny-Scheerer sterilizing apparatus, represented by Mr. Richard Kny, 17 Park Place, New York.

(*f*) The Waterhouse-Forbes water sterilizer, represented by Mr. John Forbes, 220-222 South Fifth street, Philadelphia, Pa.

In addition to the foregoing, plans of a water sterilizer were submitted by Mr. George F. Key, of Ann Arbor, Mich., and an invitation was extended to him to manufacture an apparatus in accordance with his plans, but up to the present time this apparatus has not been submitted for trial to this board. In some respects it resembled the Waterhouse-Forbes filter, to be hereafter described.

(*a*) *The Berkefeld filter.*—This had already been subjected to careful trial by one of the members of this board prior to the issue of the order under which this board was convened, and had been commended as a suitable filter for the use of troops in the field. As is well known, the cylinder of this filter is made of infusorial earth found in Hanover, Germany. Repeated tests demonstrated that one cylinder would furnish a gallon of sterile water in two minutes, but that the quantity became rapidly lessened, and that at the end of fifteen or twenty minutes the filter would become so thoroughly clogged with suspended matter as to necessitate the removal and careful cleansing of the cylinder prior to its further use. Liability to breakage of the cylinder from rough handling was a disadvantage not to be overlooked.

Further tests made by one of the members of this board served to show that repeated sterilization by boiling brought about some change in the material of which the cylinder is made, so that the test bacteria were repeatedly found in the filtered water. In the opinion of the board this observation constitutes an important defect in the Berkefeld filter. We have also had submitted to us by the representative of this company a large-sized Berkefeld filter containing nine cylinders, mounted on a substantial wooden stand and intended for transportation by muleback. This filter on trial was found to furnish 4½ gallons per minute of water entirely free of all bacteria. The advantages of the Berkefeld filter appear to be its rapid rate of filtration and its ability to exclude all living micro-organisms. Its disadvantages are rapid clogging, leading to cessation of filtration and the possibility of a change in the constitution of the cylinders, brought about by repeated sterilization, so that the filter no longer excludes bacteria.

(*b*) *The Pasteur-Chamberland filter.*—As submitted to the board, this filter consists of 12 Pasteur-Chamberland bougies, mounted in a battery, which is inclosed in a nickel-plated case, capable of withstanding 200 pounds pressure, and provided with an air valve and pressure gauge, the latter regulated at 70 pounds. The filter is mounted upon a suitable iron tripod and provided with about 4 feet of rubber hose. The introduction of the pressure valve was made at the suggestion of the board, inasmuch as actual use by troops in the field had proven that a muscular soldier could raise the pressure to such a height as to expand the filter case and render the filter useless. This company also, at the suggestion of the board, supplied the filter with a suitable charcoal strainer, intended to prevent the rapid clogging of the filter battery. A handy pumping attachment serves to force the water through the filter under considerable pressure. Upon careful trial by the board this filter was found to yield in one hour 20 gallons of clear, sterile water, free from all bacteria. Owing to some imperfection in the construction of the strainer the surface of the bougies was found to be pretty well coated with a layer of powdered charcoal at the end of the several experiments, thus interfering with the rapidity of filtration.

The advantages of this filter appear to be its portability, tolerably rapid filtration, and exclusion of all suspended substances, including bacteria. Its disadvantages are liability to breakage of its bougies, and the necessity for their frequent sterilization by boiling or by heat in order to prevent the passage of water containing, perhaps, pathogenic bacteria.

In a comparison of the two before-mentioned filters we are of the opinion that the more rapid action of the Berkefeld filter is more than offset by its want of resistance to repeated sterilization. In our opinion, if a filter must be used, the model of the Pasteur-Chamberland filter, now in use by the troops, is, in many respects, a suitable one. We hope to show, however, that it is possible and certainly desirable to obtain a sterilizing apparatus superior to any known filter.

(*c*) *The Buffalo filter.*—This consists of two porcelain tubes which can be joined tightly end to end by means of rubber gaskets, and which are inclosed in an iron tube or cylinder about 3 feet in length and 4 inches in diameter. Both ends of this iron tube can be opened or closed by means of a wrench, which at the same time forces the two candles snugly together end to end and makes the pipes or cylinders water-tight. Each porcelain candle is provided with a horizontal surface scraper made of emery. This latter runs nearly the entire length of the candles and is adjusted by means of a spring screwed beneath the filter tube. The cylinders, each containing two porcelain candles, may be mounted in batteries of 2, 4, 6, 8, etc. The water is forced into the cylinder by means of a hand pump capable of bringing about a pressure of 75 to 100 pounds.

As tested by this board, this filter, working under a pressure of 75 pounds, furnished about 1 gallon of sterilized water per minute. The test bacteria did not pass through the filter until at the expiration of forty-eight hours. Subsequent sterilization of the filter, by forcing steam through its cylinders for a period of thirty minutes, served to so damage the rubber gaskets that the subsequent tests demonstrated that the filter was no longer capable of excluding bacteria. The only advantage which this filter possessed was the possibility of cleansing the tubes without removing them. Its construction, however, did not seem to be sufficiently perfect to warrant a further trial with filters of the same general construction. Although the Squier Manufacturing Company promised to improve and deliver for trial at a later date one of their filters, up to the present time no apparatus has been received, nor have any description or drawings been placed in our hands.

(*d*) *The Maignen water sterilizer.*—Only a rough working model of this sterilizing apparatus was submitted by its inventor. It is intended to bring about the boiling, filtering, aeration, and cooling of the water, and consists, briefly speaking, of an upright boiler, having a capacity of 50 gallons, from which rises a vertical iron pipe (one-half inch) to a height of about 7 feet above the boiler, and thence horizontally for about 3 feet, ending in two vertical nipples provided with suitable stopcocks. Either coal or wood can be made use of as fuel. Fire having been started beneath the boiler, as soon as the pressure regulator indicates the presence of steam the latter is turned into the vertical and horizontal pipes, and by means of the regulation of the stopcocks is allowed to escape at a certain velocity, so that it will be condensed by the cooler outside atmosphere. Thus converted into a fine spray or rain, it is received on a square of tin placed some 6 feet beneath, and from the latter conducted into a reservoir. The inventor claims that the water, in its fall, has been cooled and sufficiently aerated to become quite palatable. As before stated, the rough model, several trials of which the inventor made before the board, was removed, in order that a few modifications suggested by the board, such as diminution in the weight, etc., might be carried out. Up to the present time no further report has been received from Mr. Maignen, and hence we are unable to give any further trials made with this apparatus. We may state that the apparatus was crude, cumbersome, and, in our opinion, not to be recommended for the use of troops.

(*e*) *Kny-Scheerer portable apparatus for the sterilization of water.*—This apparatus, as submitted by the Kny-Scheerer Company, consists of system No. I and system No. II, which are described as follows by their manufacturer:

System I. Producing capacity, 75 gallons of sterilized water per hour. Storage capacity of sterilized water, 225 gallons. The apparatus consists of—

1. A 6-horsepower upright steam boiler.
2. A duplex steam pump.
3. A single cylinder filter, with a 3-foot filter bed of flint sand.
4. A duplex filter, one filled with flint sand and the other with animal charcoal; each filter bed 3 feet deep.
5. Three galvanized-iron tanks, Nos. 1, 2 and 3, of 75 gallons capacity each, with galvanized-iron coils, with a cooling surface of 84 square feet in all.
6. A galvanized-iron reservoir tank of 75 gallons capacity.
7. A steam trap.

All mounted on and solidly braced to a heavy truck.

The steam pump lifts the water from any available source of supply (river, lake, well, etc.) and forces it through the single-cylinder filter into the reservoir tank, compressing the air in the upper part of this tank. By this arrangement a quick filling of the tanks Nos. 1, 2, and 3 is possible without crowding the filter.

The working of the filter will be as follows: The tanks Nos. 1, 2, and 3 are filled with cold filtered water. The steam pressure in the boiler is 70 pounds per square inch, corresponding to a temperature of 316° F. The steam is allowed to pass through the coil in tank No. 1 until the water is heated to about 250° or 260° F. While the water is kept at this temperature for about fifteen minutes, the tank No. 2 is heated, and so on.

After the steam has been turned off from either one of the tanks cold water is allowed to pass through the coils in an upward direction until the water in the tanks has the desired temperature. The time required for these operations would be about as follows:

Tank.	Number of gallons.	Sterilizing.	Cooling	Emptying.	Refilling.
No. 1	75	6.00 to 6.35	6.35 to 7.25	7.25 to 7.55	7.55 to 8.10
No. 2	75	6.20 to 6.55	6.55 to 7.45	7.45 to 8.15	8.15 to 8.30
No. 3	75	6.40 to 7.15	7.15 to 8.05	8.05 to 8.35	8.35 to 8.50

At 8.10 o'clock tank No. 1 is ready again for heating.

The cooled water is run through the duplex filter after sterilization and is made palatable in this manner.

To facilitate rapid filtration of the contents of the tanks a connection is provided to force carbonic-acid gas or air into the tanks after cooling and thus keep up a pressure of from 4 to 5 pounds continually. The fittings and pipings are so arranged that it is possible to work each tank separately or all at the same time.

This apparatus can also be provided with piping so as to work on the same principle as System II, described below. In this case the boiler pressure is reduced to 15 or 20 pounds, the producing capacity in this case being 100 to 150 gallons per hour.

System II; producing capacity 100 gallons per hour.

The apparatus consists of—

1. A 5-horsepower upright steam boiler.
2. A duplex steam pump.

3. A single-cylinder filter with a filtering bed of flint sand 3 feet high to superficially clean the cooled and boiled water before forcing the same into tanks.

4. A duplex filter with filter beds of flint sand and animal charcoal, each 3 feet deep.

5. Three galvanized-iron tanks, Nos. 1, 2, and 3, each of 75 gallons capacity, all provided with galvanized-iron coils, with a cooling surface of 84 square feet in all. All mounted and securely braced on a heavy truck.

The steam pump lifts the water from any available source of supply (river, lake, well, etc.) and forces it through the single-cylinder filter into the lower end of the tank No. 3. The water passes upward outside of the coils in this tank into the lower end of tank No. 2, again upward outside of the coils into the lower end of the tank No. 1, and from the upper end of this last tank into the steam boiler, entering same near the bottom.

The steam pressure in the boiler is maintained to from 15 to 20 pounds, corresponding to a temperature of 250° or 260° F.

Passing through the boiler at this high degree of temperature, the water is thoroughly sterilized and leaves the boiler near the water surface, entering the upper end of the coil in tank No. 1. The sterile water passes down through this coil, leaving the tank No. 1 at the bottom and entering the upper end of the coil in tank No. 2, thence down through this one, and in the same way through the coil in tank No. 3. At the lower outlet of this last coil the water has been cooled to a temperature of from 8° to 10° F. above that of the cold-water supply and, after passing through the duplex filter, is fit and prepared for drinking purposes.

This filter can be easily cleansed and washed out by reversing the flow of water for about five or ten minutes and running it to waste. This is accomplished by moving a single lever. By moving the same lever the filter can also be put out of work entirely, the water simply passing by the filter bed and not through it. The filter bed will last from six months to a year and can be removed without trouble. The washing of the filter beds should be done once or twice a week, according to the quality of the water, and an arrangement has been provided so that this can be done with sterilized water.

All parts of the apparatus are constructed to withstand a working pressure of 75 pounds per square inch. If, therefore, a higher temperature than 250° is wanted for sterilizing, the working pressure and temperature throughout the whole process can be increased to any desired degree within 75 pounds. In this process there is no waste of water, as all the water used for cooling purposes passes through the boiler and is sterilized (it enters the boiler at nearly boiling temperature). If an abundant supply of water is at hand, the temperature of the cooled and sterilized water may be decreased by forcing through the tanks an extra quantity of cooling water, for which an outlet would have to be provided in addition. The quantity of sterilized water may in this way also be increased without raising the temperature, or it may be increased without extra cooling water, but in this way the temperature, at the end of the process, would be correspondingly higher.

In compliance with orders from the War Department, one of the members of this board, Maj. E. O. Shakespeare, United States Volunteers, proceeded to New York on the 13th day of April and personally superintended a test of the apparatus submitted by the Kny-Scheerer Company. In principle the apparatus temporarily assembled for inspection did not differ greatly from the system already above described. At the time of Major Shakespeare's arrival in the Brooklyn establishment steam was already up in the boiler and the apparatus ready for trial. Within a few minutes it began to discharge water at the rate of a little more than 100 gallons per hour. The difference in temperature between the water from the general supply main and that issuing from the apparatus after filtration was about 12°, the issuing water having quite a palatable taste not perceptibly different from the raw water direct from the mains save a difference which was probably due to the slightly higher temperature. The inventor claimed that the apparatus was so arranged that it would not operate for the supply of water unless the temperature was considerably above the boiling point. The test lasted only about half an hour and demonstrated nothing more than the rapidity of flow of the issuing water after treatment. Assurance was given by the inventor that his bacteriologist had made numerous tests of the issuing water and invariably found it absolutely sterile, something that we might expect from water subjected to a temperature of 250° F. The price of this apparatus mounted on wheels and furnished complete would be $1,400, and it was claimed that such an apparatus would furnish abundant sterilized water for a regiment if used pretty constantly; employed for ten or twelve hours a day only, it would not be sufficient for more than perhaps two battalions.

The impression derived from an examination of this apparatus was that it was far too costly and cumbersome and impracticable for the use of an army in the field, especially under circumstances where it would frequently become necessary to detach companies or battalions from the regimental command.

(*f*) *The Waterhouse-Forbes water sterilizer.*—The principle, action, and construction of the Waterhouse-Forbes water sterilizer is described as follows by its inventors:

First. A source of water supply having a maintained level below that required for causing the water to pass entirely through the apparatus.

Second. The application of heat to a part of the water in the apparatus at the point reached by the gravity (due to the maintained level in the source of supply) until ebullition is produced, thereby causing the water to rise and pass on through the remainder of the apparatus.

Third. The transference of the heat from the hot water passing from, to the cold water passing to, the point where the heat is applied.

In order to easily illustrate the action of this principle, reference will be made to the purely diagrammatic drawing, fig. 1, in which 1 shows a water tank with a pipe, 2, through which water enters and is allowed to fill the tank up to the water level X and no higher, as it is restrained by the float-operated valve shown in the tank. The water to be treated passes from the tank No. 1 down through the pipe 3 into the compartment 4 of the heat exchange. Rising in the compartment 4, the water enters the heater 5 and rises in the pipe 6 to the level X. Heat is applied to the heater 5 by means of the flame 7, which causes the water in 5 to boil over through the pipe 6 into the top of the compartment 8 of the heat exchange. When compartment 8 has become filled, the water runs off through the orifice 11 of pipe 10. While passing down through the compartment 8 the heat of the water, which is boiling hot, is transferred, by conduction, through the partition or diaphragm 9 to the cold water passing up through compartment 4; so that the water which is boiling in 5 passes out of the apparatus nearly as cold as that entering the apparatus, while the cold water entering the apparatus becomes heated as it passes toward the heater 5 and reaches the heater in a very hot condition and nearly at the boiling point. Therefore the only heat which can be supplied is that necessary to bring the already heated water entering 5 to the boiling point and cause it to rise above the normal level X and boil over through the pipe 6, and so pass on through the remainder of the apparatus to the discharge outlet 11. It will be

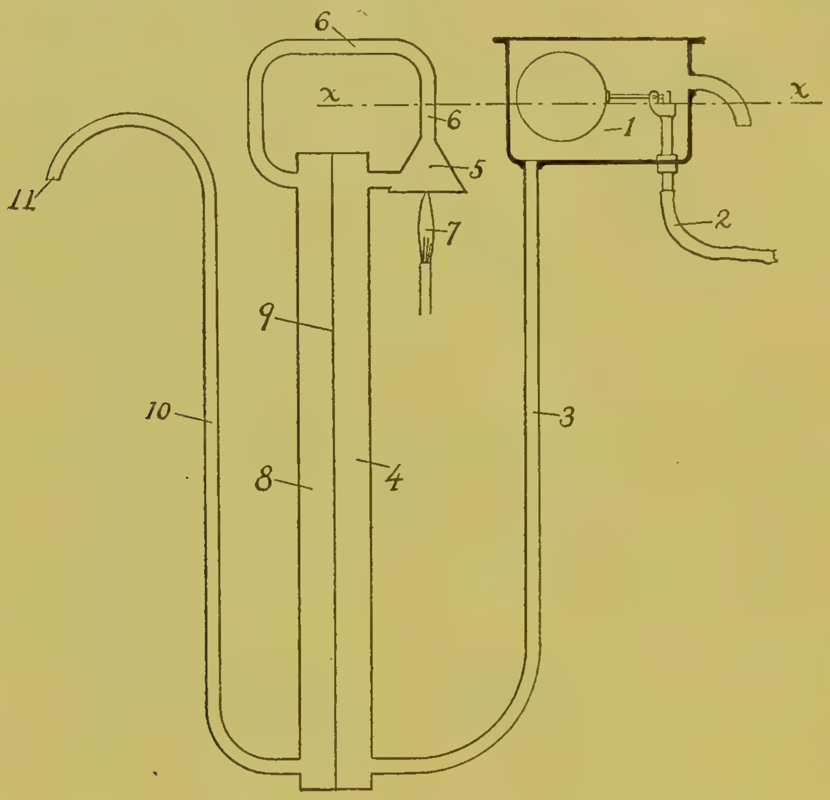


FIG. 1

observed, therefore, that but little fuel is required to operate this apparatus, for the reason that the heat is conserved and used over and over again, whereas by the ordinary process of boiling water and allowing it to cool off naturally all the heat which is required for raising the temperature of the water to the boiling point is thrown away. For example, if water is discharged from the Waterhouse-Forbes apparatus 5° higher in temperature than it had on entering the apparatus but 5 units of heat are lost for every pound of water treated, whereas by the ordinary method, assuming the water to have an original temperature of 62° F., it must be raised to 212° F. to reach the boiling point, and each pound of water treated, therefore, must have 150 units of heat put into it, and all this is lost in cooling. It is apparent, therefore, that the Waterhouse-Forbes system is thirty times more economical in fuel.

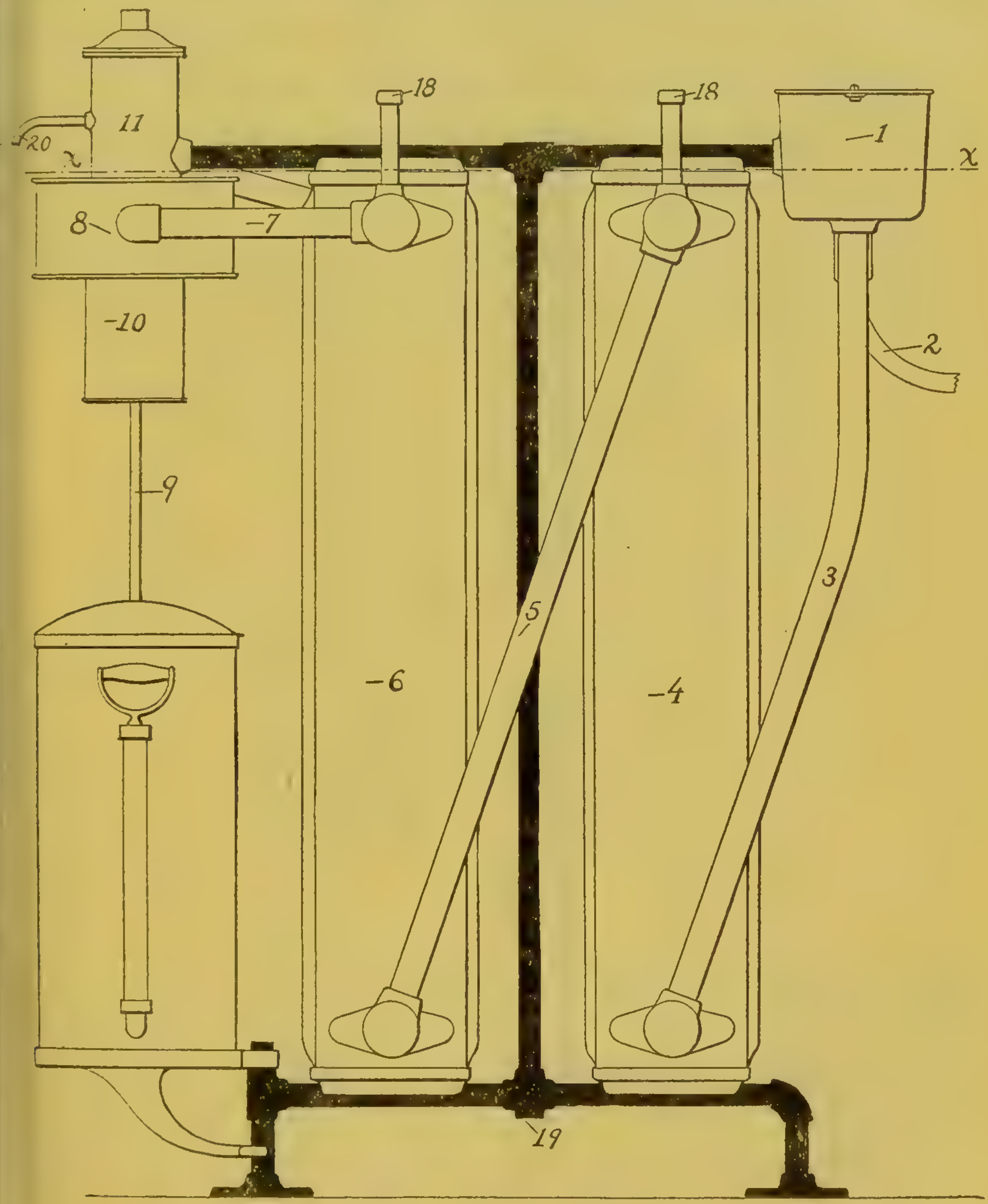


FIG. 2

Fig. 2 represents a side view of the Waterhouse-Forbes apparatus designed for the United States Government, and the view may be said to show the "raw-water side." 1 is a float box or water tank containing a float-actuated valve, which maintains the level of the water at the line X. 2 is the pipe through which the water is supplied to the float-actuated valve. 3 is a pipe through which the water passes from the float box to the bottom of the "raw-water compartment." 4 is the first heat exchange. Rising from this compartment 4, the water overflows and runs down through the pipe 5 to the bottom of the "raw-water compartment" 6 of the second heat exchange, and rising through compartment 6 the water flows through the pipe 7 into the heater 8, where it stops by gravity at the level X. Heat is

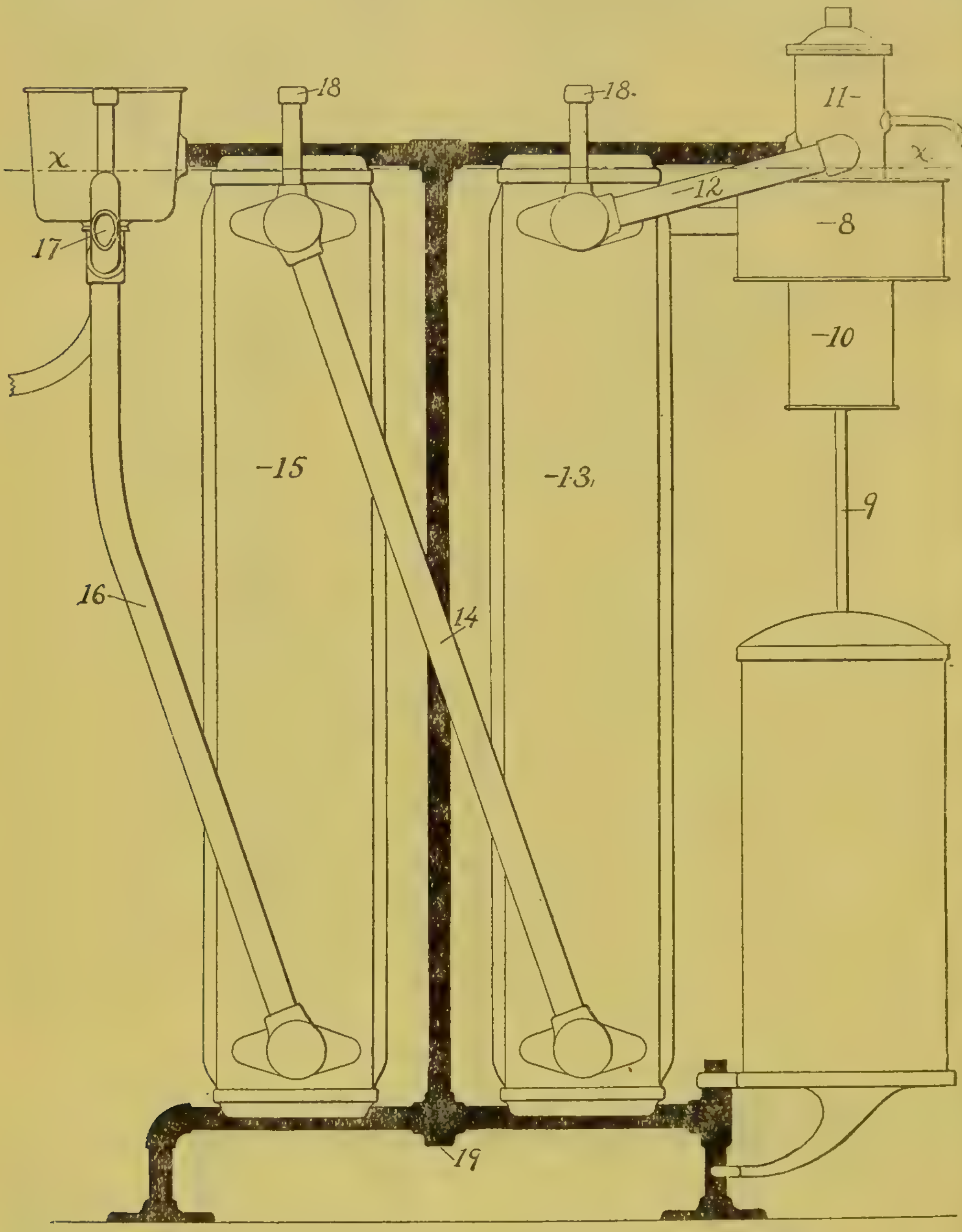


FIG. 3

applied to the water in the heater 8 by means of an oil stove 9, which flame is within the wind gauge 10. When ebullition takes place the water in 8 rises and flows over into the basin 11, and from this it runs off through the pipe 12 (fig. 3, showing "sterilized-water side" of compartment) into the top of the "sterilized-water compartment" 13. When compartment 13 and pipe 14 are filled the water runs from pipe 14 into the top of the compartment 15, and when compartment 15 is filled the water is discharged through the opening 17 of the pipe 16. 18, 18, 18, 18 are vents to prevent air or vapor trapping the flow of water. Should for any reason the water level in the float box rise above the normal line X the surplus of the water will overflow through the pipes constituting the frame and run off at 19. When the apparatus is in operation boiling hot water may also be obtained by stopping up the orifice 17 of the discharge pipe until the catch basin 11 overflows at the small spout 20. For the sake of making the drawings clearer, the frame of the apparatus has been rendered in solid black in figs. 2 and 3.

Construction: The apparatus is entirely self-contained and may easily and quickly be assembled for operation or taken apart for transportation. In the latter state the complete apparatus forms five bundles, no one of which weighs more than 45 pounds. The entire apparatus is thoroughly galvanized after its construction, thereby insuring a perfect zinc surface throughout and preventing galvanic action from the water coming in contact with different metals. The frame which carries the entire apparatus is of standard one-half inch wrought-iron pipe connected with malleable iron fittings. The various pipes constituting the frame are easily screwed into the connecting sockets and fittings, and when taken apart for transportation form a bundle of straight pipes, none of which is over 4 feet in length. The float box is of cast iron and the float is of well-seasoned white pine, specially treated to prevent water-logging. The float-box is provided with a cover which is removable by unscrewing two bolts.

The circulating pipes, through which the water passes in its course through the apparatus, are of standard three-fourths-inch wrought-iron pipes, with special cast-iron fittings. The most important part of the apparatus is the heat exchange, which in this case is divided into two units in order to lessen the weight of any single piece for transportation. Each heat exchange is in the form of a box 5½ inches square and 26 inches long. The box is divided into two water-tight compartments, 21 and 22 (fig. 4), by means of a diaphragm, 23, or sheet of thin metal. The two half shells forming this box are flanged and riveted on opposite sides and the diaphragm is held between these flanges on either side. Therefore any leaking must occur from the interior of either compartment outward, and it is impossible for a leak to occur from one compartment to the other. The diaphragm is formed of a single sheet of No. 28 gauge iron 3 feet wide by 8 feet long, folded back and forth into deep corrugations about one-fourth of an inch apart and 4½ inches deep. The half shells forming the box are of No. 20 gauge iron, and the whole exchange, both shell and diaphragm, is formed from the black iron and riveted together before galvanizing. In the process of galvanizing, the entire surface of the metal is not only thoroughly coated with zinc, but at the same time all the joints are entirely closed with zinc, and the whole made absolutely water-tight. The heads or ends of the exchange are cast into the exchange of solid metal for a depth of one-half inch, thereby not only preventing external leaking but also preventing any leak from one compartment to the other. The ends are further covered with a casting which serves to hold the exchange in its proper place in the frame of the apparatus. The heater is in the form of a flat cone having a rolled steel bottom upon which the frame impinges. From the top of the cone rises a

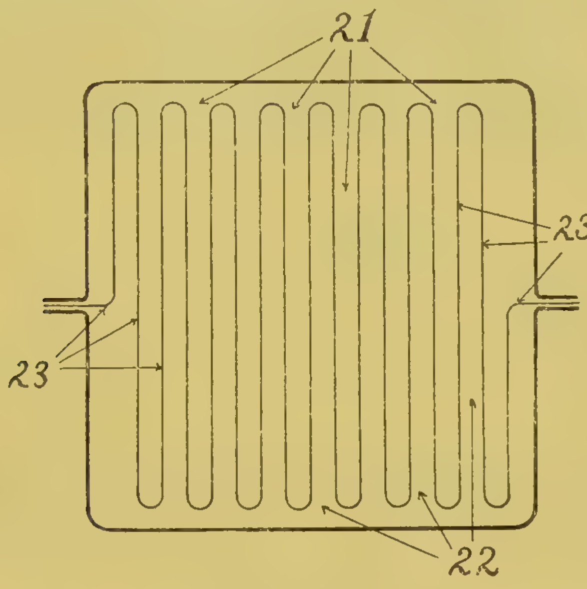


FIG. 4.

short small pipe. It is within this pipe that the water rises by gravity and stops several inches below the top of the pipe. The top orifice of this "fountain pipe" is several inches above the bottom of the catch basin 11, so that any water that boils up through the "fountain pipe" overflows and is caught in the basin 11 and can not run back into the heater, but must flow out through the pipe 12. The heater is heavily insulated with a suitable material to prevent the loss of heat by radiation. The oil stove is constructed to burn kerosene, and the oil is fed to the burner by air pressure generated by the pump. The oil before burning is made into a gas, and burns with a hot, blue flame, leaving no soot or deposit on the heating surface of the water heater.

The foregoing apparatus has occupied considerable time on the part of the board in carrying out the necessary tests of the same. As the result of numerous observations made with the three styles of apparatus, the last model having been delivered on June 29, 1899, we find that water heavily charged with the typhoid bacillus, the colon bacillus, and the bacillus prodigiosus escapes from the apparatus entirely rid of living organisms. Agar plates made with 1 c. c. of the sterilized water have shown on an average about six colonies of spore-bearing bacteria, such as the hay and the potato bacillus. The capacity of this apparatus, as the result of repeated trials with the improved lamp furnished with the latest model of the apparatus, is about 26 gallons per hour, or at the rate of 312 gallons in twelve hours, at a difference of temperature of 4½° F. between the nonsterilized and the sterilized water. Careful tests made by Dr. W. M. Mew, chemist of the Surgeon-General's Office, show that there is no loss of the natural gases during the passage of the water through this apparatus, and that it is free from lead or other substances which might have entered into solution from the alloy used for holding the diaphragm in place. The weight of the latest type of water sterilizer submitted for trial by Messrs. Waterhouse & Forbes is 150 pounds, divided as follows:

	Pounds.
Two heat exchanges, each 43½ pounds	87
Frame	8
Two frame supports, each 2 pounds	4
Float box, complete	11
Four flow pipes, with connections	20
Heater	10
Oil tank and burner, complete	10
Total	150

It will thus be seen that this apparatus is quite transportable and can be entirely taken apart and made into either four or five bundles, no one of which will exceed 43½ pounds in weight. Two such apparatus could easily be carried on a pack mule.

The advantages of this most ingenious water sterilizer are:

First. That water passing through it, although brought to the boiling point, is maintained at this temperature for so short a time as not to be deprived of its natural gases, and hence not rendered unacceptable to the taste.

Second. That all living micro-organisms, except a few spore-bearing bacteria, are destroyed by the degree of heat attained during the passage of the water through the apparatus. The disadvantage of the escape of a few spore-forming bacteria through this apparatus is considered to be of no practical importance by the board.

Third. It furnishes an abundant supply of practically sterile water and may be kept in action, if necessary, for the entire twenty-four hours without renewing the supply of oil in the reservoir, and at a cost of about 4 cents an hour.

Fourth. The water, having been slowly heated until it reaches, temporarily, the boiling point, is afterwards cooled to within 4½° F. of the water entering the apparatus. This is one of the important advantages possessed by this sterilizer. By placing the bottom of the exchange in a freezing mixture, the temperature of the sterilized water, as it flows from the machine, may be reduced below 40° F.

Fifth. Its durability and freedom from liability to breakage.

Sixth. The facility with which the apparatus may be put together and entirely taken apart, only one tool, a wrench, being required for this purpose.

Seventh. The facility with which the apparatus can be thoroughly cleansed. This is effected by the removal of the side pipes, thus permitting a complete flushing out of both exchanges.

The fact that the apparatus does not clarify the water is also deemed of no particular importance by the board, since this may be easily effected prior to its passage through the sterilizer by means of one or two water barrels partially filled with fine and coarse sand and placed at a proper height above the sterilizer.

The manufacturers, in a letter dated July 21, 1899, state that such an apparatus as they propose supplying to the Government would differ from the last model submitted to the board as follows:

First. Certain parts would be made of malleable iron instead of cast iron, as being more durable.

Second. The frame and supports would be galvanized instead of painted black.

Third. Special fittings would be used in the connections of the flow pipes instead of the commercial pipe fittings, thereby reducing the outside lateral dimension somewhat.

As the result of exhaustive experiments, the minute details of which it is not considered necessary to enter into in this report, the board is of the opinion that the Waterhouse-Forbes sterilizer is superior to all filters or other water sterilizers submitted for trial, and that it is well adapted for the abundant supply of sterile water to troops serving in the field. The last model submitted to the board, containing two heat exchanges and having a capacity of not less than 300 gallons of sterilized water per twelve hours, at a difference of only 4½° F. between the non-sterilized and the sterilized water, is considered to be the size most suitable for issue. This we believe to be capable of supplying a sufficiency of pure water to two companies. If in permanent camp and with the opportunity of accumulating a supply of sterilized water, we believe that one such apparatus would be equal to the need of a battalion. We therefore, after a careful consideration of the requirements of Special Orders, No. 306, Adjutant-General's Office, Washington, December 29, 1898, respectfully recommend that the Waterhouse-Forbes water sterilizer be issued for the use of troops serving in the field.

WALTER REED,
Major and Surgeon, United States Army.
VICTOR C. VAUGHAN,
Major and Division Surgeon, United States Volunteers.
E. D. SHAKESPEARE,
Major and Brigade Surgeon, United States Volunteers.

The SURGEON-GENERAL, UNITED STATES ARMY,
Washington, D. C.

Recently the attention of this office was invited to the advantages presented by the Vaillard-Desmaroux water sterilizers. These are constituted on the same principle as the Waterhouse-Forbès apparatus and deliver a sterile water at a temperature only slightly above that of the entering water. It appears, however, that an apparatus which will furnish 200 liters per hour weighs not less than 882 pounds. As the Waterhouse-Forbes sterilizer, which delivers this quantity of water, weighs only 150 pounds, its advantage over the other for army purposes is manifest.

FOOD SUPPLIES.

The remarks of medical officers under the head of "Food supply and its preparation," in the monthly sanitary reports, are of a most satisfactory character. "The commissary supplies are of the first quality and are well prepared for the table" or "The rations served are of good quality and well cooked" are common expressions in these reports.

From a few of the home posts in the Southwest there came, as usual in time of peace, a complaint of the toughness and poor quality of the fresh meat furnished by the contractor. Thus the post surgeon at Fort Ringgold, Tex., in February, 1899, reported the beef issued as poor and not up to the standard usually provided. The contractor was notified, and thereafter the beef was reported as equal to or above the average furnished at Western army posts. A similar complaint was lodged in June, 1899, by the post surgeon at Fort Reno, Okla. In a few instances the quality of the fresh bread issue was criticised. Thus in August, 1898, the bad quality of the bread was referred to as probably due to the fact that the flour used had been shipped to Santiago, Cuba, and on its return had been issued for use at this post.

The subsistence officer reported that this flour had now been used up and assumed that no further cause for the issue of poor bread from this cause ought to exist; nor was the complaint of bad bread subsequently renewed. At Fort Meade, S. Dak., the post surgeon reported the food supply as good, but claimed that its preparation was unsatisfactory owing to a want of experienced cooks and bakers. At Fort Douglas, Utah, in January, 1899, the unexpected discharge of three bakers, under telegraphic orders from the War Department, was the cause of the poor quality of bread furnished to the command during the month. These are the only complaints from the home or permanent posts, and when we consider the disturbed condition of the garrisons during the year, the discharge of trained men from the company kitchens and their replacement by recruits, it is surprising and gratifying to find that medical officers had so little to say in criticism of the methods of food preparation.

But even from the camps of organization, the troops in the field, and those subsequently in garrison in Cuba and Puerto Rico, there came few official complaints, either of the character of the articles issued by the Subsistence Department or of the methods or results of camp cookery, although at times the press of the country published many grewsome accounts of both in the form of letters from discontented volunteers, self-constituted camp inspectors, and newspaper writers. At the time when the country was agitated over the quality of the canned roast beef and the refrigerated beef furnished to the troops in the field, there were on file in this office only two papers having a reference to the beef supplies. One was a statement concerning the poor quality of the native Hawaiian beef issued to troops at Honolulu, H. I., with a request that refrigerated beef be provided instead. The second occurred in a report of a voyage made by the *Panama*, with sick and convalescents, from Ponce, P. R., to Fort Monroe, Va. The medical officer stated, incidentally, that the 720 pounds of refrigerated beef which he had received from the Subsistence Department had proved of great value to him during the trip. Concerning the quality of the canned roast beef which was called in question toward the close of the year 1898, nothing need be said here, as the subject has already been thoroughly investigated. It may be mentioned, however, that for a time, in May, 1899, during the occupation of San Fernando, P. I., report was made that the troops had been for a long period on the travel ration and that their health had no doubt suffered thereby. This was remedied as soon as reported, and no further complaint of this kind was made.

As to the refrigerated beef, it may be stated that a report of the toughness and stringiness of the fresh meat issued was made by the surgeon at Cabana Fortress, Cuba, in July, 1899. This meat was bought in open market, to supply deficiency when the contractor failed to receive on time shipments of beef from the United States. The open market purchases were from native Cuban cattle or from cattle imported from the States, neither of which gave satisfaction. The regular issue was Chicago refrigerated beef, which is reported as of excellent quality and of full weight. Again, at Cebu, P. I., in April, 1899, the medical officer reported that the quality of the fresh meat was poor. The only available meat at that time was native beef, which was very inferior in quality as compared with the frozen meat from Australia supplied to the troops in and around Manila.

A deficiency of fresh beef was noted at Iloilo, P. I., during April and the first two weeks of May, 1899. This was referable to the difficulties attending the supply of the troops at that place, and special efforts were made to overcome them. In fact, so far as regards the subsistence of the troops operating in the Philippines, the reports just cited are the few exceptions to the general rule that the subsistence officers were eminently successful in having everything ready for issue when required, even in the trenches and on the firing lines. Thus, concerning the supply of the Second Brigade, First Division of he Eighth Army Corps, which during the month of February, 1899, held the line of trenches south of Manila, Maj. George H. Penrose, brigade surgeon, reported that the food supply was excellent; the troops had plenty of fresh beef and fresh bread, and most of the organizations had their rations cooked in the city and sent out to them by rail. Concerning the Second Brigade, Second Division, which during the same month held the pumping station and pipe line extendng across the country about 8½ miles, Brigade Surg. Samuel O. Potter reported that the food was the regular garrison issue, and included fresh beef of excellent quality seven days in ten, with fresh bread and an ample supply of vegetables, and represented the cooking as having been particularly good for field kitchens.

The troops in Cuba and Puerto Rico appear from the sanitary reports o have been as well provided for during the year as those in the Philippines, for I find in the mass of these reports only two statements which are worthy of passing notice. In the Department of Matanzas and Santa Clara, in August, 1899, several references were made by medical officers to the poor quality of the bacon issued, and on August 9, 35 cases of ptomaine poisoning (fortunately none serious) attributable to this cause were reported from La Popa Barracks, Trinidad. This led to an inquiry, and the departmental subsistence officer explained that the method recently adopted of frequent shipments of small quantities would give satisfaction hereafter. In May, 899, the post surgeon at Manzanillo, Cuba, took exception to the quality of the bread, and recommended the employment of a native baker for the instruction of the post baker. This was a mere matter of post administration. There was no objection to the employment of a baker paid from the bakery savings, or to a proper exchange of lour for bread baked in the bakeries of the city. In fact, the sanitary reports from Cuba and Puerto Rico show that the medical officers on duty at the military posts and camps in the islands fully agree with nspector-General Breckinridge, when, in March, 1899, after a careful nspection of their sanitary condition, he expressed himself as follows:

> It was gratifying to find in the excellence of the food among the troops the decided reflection of the admirable and generous and liberal supplies in the subsistence storehouses. One could hardly ask for better food than some of that I asted at the cook tents of the Eleventh and Nineteenth Infantry, though, generally, the preparation of this food was simply with the conveniences that are given for camp life.

The ration provided by Congress for the troops of the United States s ample and compares favorably with that of any other nation. The only criticism made by medical officers, so far as I can gather from their sanitary reports, is that for use in tropical climates the ration provides more of the hydrocarbons or fats than is needful and that therefore these articles might with advantage be reduced in quantity and the carbohydrates or starches and sugars to some extent increased. Indeed the first sanitary report received at this office, from a volunteer regimental surgeon, called attention to the advisability of having the food supply issued to the men increased by an allowance of rice and onions. This report came from the regimental camp of the Second Massachusetts Infantry at Tampa, Fla., May 31, 1898, Maj. H. C. Bowen, surgeon.

For my own part, with our system of company fund, I see no reason for making any special change in the ration. Because bacon is on the list of its components it does not follow that the men must eat the bacon or go hungry. Those articles not used are credited to the men and their money value can be used for the purchase of the articles that are found to be more desirable under existing conditions. Our present ration suffices for men under conditions of active service and extreme cold. It must therefore be sufficient under conditions which call for less heat production and for the expenditure of less energy, and thus give company fund for the purchase of articles from the liberal supplies of the Subsistence Department or from outside sources that appear to be better suited for the occasion than the specified articles of the ration. I consider it wise, therefore, to be slow in suggesting alteration in the components of the ration until experience has shown just what changes are assuredly desirable.

But while it may not be advisable to make any change in the ration established by law, it is a matter of the first importance to determine what is the best dietary for tropical use, that medical officers may urge its adoption by company commanders and that subsistence officers may have its components always on hand for issue. The only special discussion of the subject made up to this time is an article by Maj. Louis P. Seaman, First United States Volunteer Engineers, published in the New York Medical Journal, March 18 and 25, 1899. This officer gave his experiences of the intestinal inflammations which prevailed among the men of his regiment shortly after their arrival at Puerto Rico, and attributed these diseases chiefly to the irritating qualities of the ration issued and used. Much might be said in opposition to this view. Troops have lived on this same ration in hot climates without being affected by diarrhea, while, on the other hand, the command at Ponce, P. R., was exposed, irrespective of any alleged irritating qualities of the ration, to many of the predisposing and exciting causes of enteric irritation. Many of the medical officers considered that the prevalence of diarrhea at Ponce was due to the injudicious use of native fruits, to which the men were not accustomed. The commanding general gave an official expression to this view. However, having assumed the ration, or dietary rather, to have been at fault, Major Seaman suggested such changes as a reduction of the animal foods by one-half, substituting therefor an equivalent of farinaceous foods; a reduction in the quantity of salt meats; the use of cereals, such as hominy, and of legumes, such as the frijoles or native red beans, and the use of dried fruits, particularly apples and prunes.

Major Seaman, with the praiseworthy intention of profiting by the views of those who have had experience in tropical climates, has offered, through the Military Service Institute, a prize of $100 in gold (or a medal of that value, as the winner may elect) for the best thesis on "The ideal ration for an army in the tropics," the award to be as determined by the council of the Military Service Institute, suggesting that the prize be limited to commissioned medical officers, or otherwise, in the United States Army or Navy. The council accepted the offer made by Dr. Seaman, and decided that the competition be open to all commissioned medical and other officers of the Army and Navy, volunteers and regulars; that all papers on this subject be submitted by March 1, 1900, and that Colonel Weston, Acting Commissary General, Lieutenant-Colonel Smart, Deputy Surgeon-General, and Lieutenant-Colonel Dougherty, Fourth United States Infantry, be constituted a board of award. This will probably draw out the results of our experience during the past year and a half in a more detailed and elaborate form than would otherwise have been the case, and Major Seaman is to be congratulated on his idea, for certainly our officers will be actuated by the desire of attaining the honorable distinction of having contributed the most valuable paper on this important subject.

In hospitals the 60-cent allowance for subsistence enabled medical officers to provide freely of every delicacy desirable for the sick. At few of these was the whole allowance expended. At the general hospital at Fort Monroe, Va., the average expenditure per man during the months August to December, inclusive, was only 30 cents. At Columbus Barracks, Ohio, 38 cents provided sick diet "ample in all its details." The present allowance of 40 cents will undoubtedly cover the needful expenditures in our hospitals generally, although in some exceptional instances where high prices prevail a larger sum may be desirable.

CLOTHING.

Most of the references to clothing in the sanitary reports have come from commands in Cuba and the Philippines. The blue uniform used in the United States was universally condemned as too heavy and the woolen undershirts as occasioning much irritation of the skin from prickly heat. Canvas suits were represented as so stiff and heavy as to chafe the wearer until they became softer and somewhat pliant after repeated washings. A similar complaint was entered against some of the khaki issues. The campaign hat was condemned at first as too heavy. It was argued that the helmet used by the British troops in India gave the best protection for the head in tropical countries, on the ground that were this not so the British would have discovered the fact long ago. Cork helmets were issued on special requisitions to some of the commands. But a longer experience with the campaign hat, particularly after the rainy season set in, showed it to have advantages not possessed by the other forms of head gear.

As the result of general experience it may be said that a light-weight woolen undershirt is regarded as essential to prevent chilling of the body when damp with perspiration. Drawers should be of the same material, although some medical officers consider cotton to be preferable as cooler. A white-duck uniform is recommended for garrison duty and khaki suit for field service.

As no reference to socks or shoes appears in the sanitary reports, it is inferred that these have given entire satisfaction.

The desirability of having rubber clothing for use during heavy rains was expressed by a number of medical officers. Rubber boots, hats, and coats or slickers were ordered by telegraph from the office of the chief quartermaster of the division, but the supply appears to have been slow in arriving from the home depots.

Reports of recent date indicate that the troops are now well provided with suitable clothing. The following from Acting Asst. Surg. Charles Farmer, Placetas Barracks, Cuba, dated July 29, 1899, illustrates the general character of these reports:

In compliance with a recent circular from the chief surgeon of this department, calling for a report as to whether the men of this command are suitably clothed, I have to state that each man is supplied with at least two khaki suits, two suits of thin underwear, and two pairs of shoes. Most of them have more than this. They are all provided with the blue flannel shirt. The quartermaster informs me that requisition has been made for cambray shirts for the command.

TENTAGE.

During the year the troops, when in what was regarded as temporary camps, were sheltered under canvas, common tents, conical wall tents, and hospital tents being used for the purpose. In a report from Manzanillo, Cuba, March 11, 1899, Inspector-General Breckinridge called attention to the great difference in temperature between the atmosphere of brick and other barrack buildings and that of the tents in common use.

	° F.
Hospital (brick building and tile roof)	81
Officers' quarters (wooden building, tile roof, shades over windows)	81
Barracks (wooden building, zinc roof)	84
Barracks (wooden building, thatched roof)	83
Ordinary tent (without floor)	90
Hospital tent (with floor)	91
Sibley tent (with floor)	96

In another report, dated April 3, 1899, General Breckinridge stated his opinion that if tents must be used in hot climates, three thicknesses of canvas should be employed, as each additional layer removes several degrees of heat.

Recently Capt. E. L. Munson, assistant surgeon, United States Army, has brought to the attention of the Department a modification of the hospital tent by which effective ventilation is secured and the temperature of the interior is, in hot climates, materially lowered. The principle is applicable to all tents which are provided with flies. For hospital purposes, pavilion wards consisting of these modified hospital tents have manifest advantages over the tent wards of the field hospitals of 1898. Captain Munson describes his improvements in tent construction in the following communication:

With the military occupancy of our new island acquisitions the unsuitability for tropical climates of our regulation tentage, particularly that used for the shelter of the sick, became at once apparent. While not seriously defective when used under the conditions of weather and temperature for which they were originally designed, the several types of tent used in our service are all intensely hot and close under the vertical sun and in the humid atmosphere of the tropics. With reference to the hospital tent, these undesirable qualities appeared to be presumably due—

(1) To the impingement of the direct solar rays upon the single thickness of canvas of the walls and sides.

(2) To the insufficient air space and limited opportunity for the movement of air between the fly and roof of the tent.

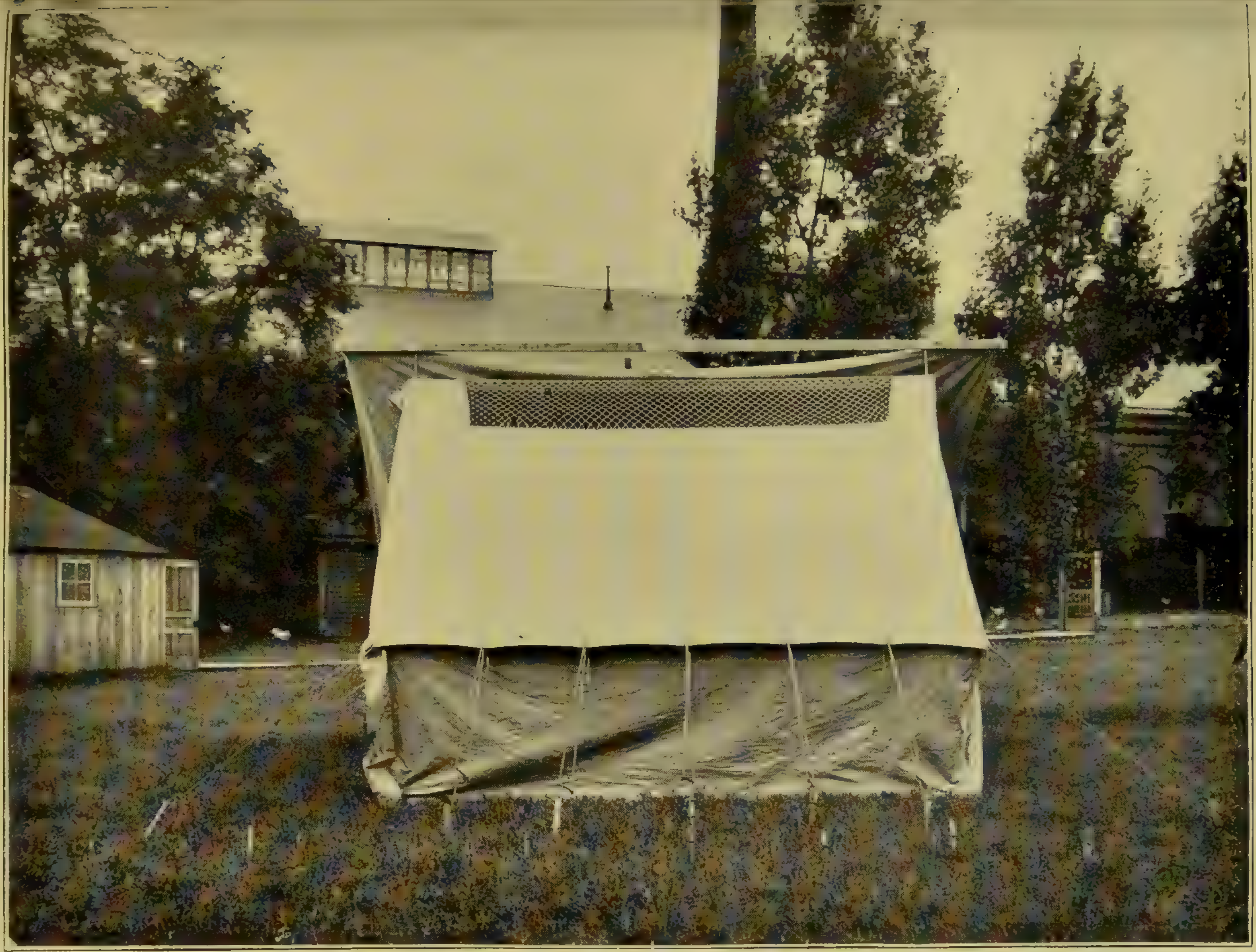
(3) To the inadequate size and improper location of the openings for ventilation.

After some consideration the writer suggested the following changes in the regulation hospital tent which, it was believed, would materially improve the latter for service in the Torrid Zone:

First. That the present tent fly be enlarged 2 feet in length and 4 feet in width.

Second. That this fly be raised upon a light false ridge placed 1 foot above the true ridge, this false ridge being 4 feet longer than the true ridge and projecting 2 feet to the front and rear. This is accomplished by lengthening the present pole pins by 1 foot and providing two suitable metal-lined sockets in the false ridge for their reception. This false ridge is provided with a short pin on the upper aspect of each extremity to keep the canvas in position, while, to facilitate transportation, this false ridge is divided obliquely in the center and inclosed in a galvanized-iron box to form the joint.

Third. That the canvas comprising the top of the tent be cut out for a space 2 feet wide on each side of the ridge and running the entire length of the tent, except 1 foot front and rear. The canvas thus removed is replaced by heavy rope netting, having a mesh about 2 inches square.



VENTILATED HOSPITAL TENT (MUNSON). SIDE VIEW, WITH FLY THROWN BACK TO SHOW RIDGE VENTILATION AND JOINTED FALSE RIDGE

Fourth. That the tent fly be white in color, to better reflect the heat rays, while e tent itself is drab, to render the light in the interior properly subdued.

Through the kindness of the Surgeon-General a tent made on the above plan as sent to Washington Barracks for trial, as a result of which trial, extending er a number of weeks, I feel justified in making the following claims for this nt:

First. That with walls down this tent in a summer or tropical temperature ill be from 7° to 10° cooler than the regulation hospital tent, and from 10° to 18° oler than the new-model conical wall tent. This fact was determined by pitch- these three tents closely together and observing the inside temperatures, as so that under the dense shade of a neighboring tree. The following readings ere obtained by consecutive observations:

	Improved hospital tent.	Present style hospital tent.	New model conical wall tent.	Dense shade.
rst reading	84	89	93.5	79.5
cond reading	86	94.5	94	80.5
ird reading	86	93	97	83
urth reading	89.5	99	107	84
fth reading	93	97.5	106.5	86

These five readings show an average temperature of 94.5 for the regulation hos tal tent and 87.5 for the improved hospital tent, an average difference of 7°. In e occasion, subsequent to the above, a difference of 10.5° was noted. As com- red with the conical wall tent the difference was even more marked, ranging om a minimum of 9.5° to a maximum of 18.5° in favor of the improved tent.

Second. That with walls rolled up this tent averages, with summer temperature, or 5° cooler than the old style hospital or conical wall tent, closely approaching e temperature of dense shade from foliage.

Third. That this tent, owing to its free ventilation (as at present planned it has square feet of ventilating space where the old style tent has about two-thirds 1 foot), is nearly as cool with walls down as with walls up, an average differ- ce of only 3° or 4° being noted. This property is of particular value for hospital ntage where the seclusion of the sick and their immunity from intense light and isturbing outside influences will do much toward promoting recovery.

Fourth. That in case of necessity more than the six patients ordinarily allotted each hospital tent may be safely placed in this tent, since the ventilation is so ee that the inmates are practically in the open air.

Fifth. That when several of these improved tents are pitched together to form hospital ward a continuous roof is formed by the large flies, while the tents emselves are located 4 feet apart, thus dividing the ward into tent sections, per- itting free lateral ventilation, allowing entrance or egress of the inmates of each nt without the necessity of passing through the other tents of the ward, permit- ng the ready isolation of each tent section in the case of contagious disease, and, nally, in furnishing a covered interspace which may be excellently utilized for e shelter of ward property or the recreation of convalescents.

Sixth. That the total weight of this tent is increased, as compared with the old ent, only by the slight additional weight of the light false ridge and the extra anvas of the fly.

Seventh. That the portability of the new tent is the same as the old-style tent, ince the long false ridge is made in two parts to facilitate transportation.

Eighth. That no great or costly changes in the existing hospital tentage are e essary, and that the tentage now in use may be readily remodeled on the mproved plan suggested.

Ninth. That in case of loss or injury to the false ridge or large fly the present tyle fly may be used and will give perfect protection to the interior when placed n either the true or false ridge.

Tenth. That in case this tent is at any time required for use during cold veather it may readily be made as snug as the old tent by merely placing an ordi- ary fly over the true ridge under the false ridge and large fly and pegging it lown, so that the smaller fly will lie against the tent roof, and thus close the large ventilating opening.

Eleventh. That this tent is as stable as the ordinary hospital tent. This fact has been amply demonstrated by the high winds which have on several occasions prevailed during the period in which this tent was undergoing trial. This tent is preferably pitched with a double set of guy pins, and hence is more firmly held to the ground than the old-style tent.

Twelfth. That by the use of the overhanging fly and the corner-fly guy ropes, stretched at the proper angle, the necessity for the use of the long and inconvenient end stays required to steady the old-style tent is done away with.

The above claims are borne out by the reports submitted by the special inspectors of the Medical and Inspector-General's Departments detailed to investigate and report as to the advantages and practical utility of this tent, as a result of which reports this tent has been adopted by the board of equipment for use in the military service.

THE MEDICAL STATISTICS OF THE ARMY.

In this report are presented only the medical and surgical statistics of the Regular Army for the calendar year 1898, with a discussion of the prevalence of disease in the whole Army, regulars and volunteers, from the beginning of the Spanish war to June 30, 1899, based on the mortality by months from all causes and from certain specified diseases.

It was difficult to obtain, even from the regular regiments when in the field, the monthly reports of sick and wounded required by the regulations. This was due in part to the impossibility of having a full staff of regular medical officers with each regiment, on account of the limited number of the regular medical corps, and of the many members of that corps who had to be assigned to important administrative duties as chief surgeons of corps, divisions, and brigades, surgeons on duty in hospitals and hospital ships, medical supply depots, etc.

Many surgeons on contract, with no experience in the keeping of the records of sick and wounded, had therefore to be assigned to duty with the regiments. Chiefly, however, was this difficulty due to the unusual conditions under which the medical department was required to do its duty during and after the attack on Santiago. Something may be understood of these conditions when I state that the casualty lists required to be forwarded to my office by each regimental surgeon immediately after an engagement with the enemy were not received for a month after the fighting had ceased. When they arrived they were found to be written in pencil on blank sheets torn apparently from private letters and other such scraps of soiled and weather-stained paper as could be obtained in the trenches or in the camps to which the regiments were afterwards withdrawn. The field desks of the regimental medical officers were on the transports, and, indeed, in some instances, returned on these vessels to the United States. These officers, however, made every effort to report their casualties as previously they had made every effort to care for the men disabled.

Later, when the health of the troops broke down under the exposures and fatigues of the campaign, with malarial fevers prevalent, yellow fever spreading, and from 100 to 200 men in each regiment claiming attention at sick call every morning, even the best trained and most energetic medical officer found it difficult to keep a satisfactory record of his cases, while others gave up the attempt to do so and devoted the whole of their energies to the care of their sick men. Even at the field division hospitals and at the base hospital at Siboney the work of caring for the sick was such as to render it impracticable for those in charge to forward reports of sick and wounded. After the closure of these hospitals, however, their registers and other original records were sent to this office and the statistics were gathered from them instead of, as customary, from monthly reports transcribed from them. The history of sick men whose cases failed to be reported on regimental records were thus picked up in fragmentary condition from the records of these hospitals, from those of the transports which relieved these hospitals, or from the records of Montauk Point, Fort Monroe, or other general hospitals in the United States to which the sick men had been transferred from the transports.

A very fair representation of the seriously sick men of the regular regiments has thus been gathered for tabulation in this report; but on account of the failure of some of the regimental surgeons to furnish reports for July and August or to keep accurate and complete records of their sick for those months many of the lighter cases treated in quarters until return to duty have necessarily been lost to the record.

For pension purposes these medical records of the regular troops for the past calendar year are in excellent condition. Each entry on the various reports—regimental field hospital, transport, hospital ship, and general hospital—has been carded, and the various cards relating to each individual have been brought together to show his medical history so far as reported by the medical officers who had charge of his case. To cover the medical history of the year, over 100,000 histories had to be carded and are now arranged alphabetically in the files for ready reference.

If it was difficult to obtain monthly reports of sick and wounded from the regular troops, it may easily be understood that to obtain them from the surgeons of volunteer regiments was no light matter. These officers, as a rule, had no experience in making out such reports, nor did they seem to appreciate their importance in connection with future claims against the Government or with the rights of the disabled soldier under the pension laws. The hospital stewards appointed to the regiments were equally ignorant of the methods of keeping records of the sick. Chief surgeons of corps and divisions endeavored to gather up the monthly reports for transmission to this office, but without success. They endeavored to effect their object by lectures on the subject, by sending regular medical officers to give practical demonstrations, and by sending regular hospital stewards to instruct the regimental stewards, but all without immediate success except in a few special instances. Every corps surgeon who has sent in a formal report of the medical history of his command comments on the difficulty he experienced in getting monthly reports of sick and wounded from his regimental surgeons or, indeed, in some instances, in getting them to keep a register of their cases. Ultimately reports were received from a majority of the regiments, but the Spanish war was at an end and certain of the regiments ordered home for muster out before monthly reports from all to date had been received at this office. Whereupon, at my request, the Adjutant-General of the Army directed that—

> Mustering officers will require medical officers of regiments ordered to be mustered out to render at once to the Surgeon-General of the Army such monthly reports of sick and wounded as they may have failed to forward, for any cause, at the time such reports were due. They will also require that all retained medical records, including registers of patients, be forwarded to that officer, to whom medical officers will apply for certificates that these reports and records have been filed in his office.

This proved effectual, and I am of the opinion that the records and reports now on file in the War Department are as complete and accurate as they could be made by the medical officers concerned. That they will fulfill all Pension Office purposes is assured, as practically the same form of monthly sick report has done so for the past sixteen years. In fact the present form is a product of the experiences of the civil war. It was drawn up in 1883 by an officer of the Medical Department who was thoroughly familiar with all the requirements in pension claims and who held these requirements specially in view in drafting his form. Later, in 1892, it was revised and put into its present shape by another officer of the corps, who endeavored to make it meet the exigencies of field service by lessening the clerical labor of filling it out, while preserving the essentials of the original form.

When the civil war broke out, the magnitude of the Pension Office business, which arose from it in after years, was not foreshadowed in the mind of any medical officer of the Army. The monthly report in use at the time was of no value in pension claims. It was merely statistical and sanitary; it showed the number of cases of typhoid fever, remittent fever, diarrhea, and certain other specified diseases which had occurred in the command during the month. This was statistical; it showed the medical director of a corps an unusual prevalence of a specified disease in certain regiments and tacitly invited him, as a result of his study of the numbers, to make inquiry into the causation with a view to remedy the evil. This was sanitary; but no name was given on the report unless a man died or was discharged for disability. The medical record of a claimant for pension had to be sought for in field registers, prescription books, case books, etc. This, when the pension list began to attain large proportions, led to the suggestion of utilizing the monthly report of sick and wounded, so that the entry thereon having been found, no further search would be necessary unless the recorded disposition of the case was a transference to some hospital, when, of course, a reference to the register or reports of that hospital would be needful to follow up the history. The reports of sick and wounded sent in by the volunteer surgeons of the Spanish-American war are thus very different in character to those required from the regimental surgeons of the civil war and are of immensely greater value for dealing with claims under the pension laws.

To deal with the entries on these reports for statistical purposes, it is necessary to have a card made for each entry. These are then arranged so that all the cards for the same man are brought together, thus preventing any duplication or, indeed, multiplication of cases. A man reported as a case of typhoid fever may have his name appear first in a regimental report. A few days later it may be found in the report of a division hospital, and again in that of a transport or a general hospital. For a long-continued case of sickness or injury there may be as many as half a dozen entries on the sick reports, so that a very erroneous idea of the absolute number of cases treated would be obtained by a mere count of the recorded admissions to sick report, and the relation of deaths to cases based on such a count would be equally erroneous. The carding of the entries and the subsequent arrangement of the cards bring the fragments of the history of each case together and eliminate this source of error in the statistics. But this system of carding and arrangement to bring together the detached portions of an individual history is, as I have explained above, just what has to be carried out to have the cards ready for reference when an official inquiry is made concerning them. In my office I have the sick reports of the Regular Army thus carded, which enables me not only to give prompt replies to inquiries concerning the medical history of any particular case, but to present with this report as fairly accurate a view of the medical and surgical statistics of the regular troops as can be given from the reports on file.

I regret that I am unable to present a similar view of the statistics of the Volunteer Army and hence of the Army as a whole (Volunteer and Regular). The act of Congress approved April 22, 1898, which authorized the President to raise a volunteer force, required that—

> Regimental and all other medical officers serving with volunteer troops in the field or elsewhere shall keep a daily record of all soldiers reported sick or wounded, as shown by the morning calls or reports, and shall deposit such reports, with other reports provided for in this section, with the Record and Pension Office, as provided herein for other reports, returns, and muster rolls.

With the view of securing the medical records of the volunteer troops in condition for prompt transfer, in accordance with the provisions of this act, I immediately called for separate reports of sick and wounded, for regulars and volunteers, from all posts, garrisons, hospitals, transports, etc., where the garrisons or cases under treatment were mixed or liable to become so. No trouble was afterwards experienced in this regard.

I have already spoken of the difficulty encountered in gathering in reports of sick and wounded from the volunteer regiments. These were not rendered month by month, but in August and September, 1898, many reports were received, covering the entire period from the date of muster into the service of the United States. The clerical force of the statistical division of my office was at this time under strain in dealing with the work connected with a rapidly increasing Regular Army and in answering calls for information concerning both regulars and volunteers, but the temporary clerks afterwards attached to it enabled me to complete the carding of the reports from the regular troops. Meanwhile, December 10, the Spanish-American treaty was signed at Paris, and under the terms of the act of Congress I was called upon to turn these volunteer records over to the Record and Pension Division of the War Department. Since then all reports and records of volunteer troops enlisted for the Spanish-American war have been turned over by me to that division, in accordance with law.

I trust, however, that arrangements in progress will enable me to submit to you hereafter, as a supplement to this present report, a full tabulation of the medical and surgical statistics of the Spanish-American war.

The mean strength of the Regular Army for the first four months of the calendar year 1898 was only 28,198; but subsequent to this the strength was increased to 65,631 in December, the mean for the year being 46,635.

The admissions to sick report were equivalent to 2,146.94 per thousand of strength, or to somewhat more than two entries per man of the mean strength present during the year. Although this is greatly in excess of the ratio of admissions in 1897, 1,186.61, and of the mean annual ratio of the decade 1887–1896, 1,243.39, the actual rate was undoubtedly much larger, for, as already stated, some of the reports for July and August were not rendered or were evidently incomplete. This excess of admissions was due to the various camp diseases, which caused 1,937.71 admissions per thousand of strength during the year, as compared with 896.53 in 1897. Malarial infection was reported to have been the cause of 32,393 admissions, or nearly one-third of the whole number taken on the sick reports, equaling 694.64 cases for every thousand men enrolled. Diarrhea and dysentery contributed 14,166 cases, or one-seventh of the whole number taken sick; injuries 9,758, or nearly one-tenth of the whole, but only 1,457 of these were gunshot wounds, while 3,787 were contusions, only one of which was fatal; typhoid fever, 4,130 cases, equal to 88.56 per thousand men; yellow fever, 604 cases, or 12.95 per thousand, and venereal diseases, 3,727 cases, or 79.92 per thousand.

No satisfactory view of the relative prevalence of sickness or disability from injury can be obtained by comparing the rates of admission to sick report during a period of war with the corresponding rates of the Army in time of peace. When troops are doing garrison duty under peace conditions, every man who is excused from any part of his military duties on account of some slight ailment or injury is taken on sick report and accounted for in the number of admissions. Necessarily this does not hold good in time of war. During the active operations of a campaign trivial cases receive medical attention at sick call, but are seldom taken up on the registers. Probably few of the cases reported on a garrison register as sick in quarters would appear on the sick reports if the command were in the field in war time. An admission rate of x per thousand of strength in quiet garrison life would not imply such a prevalence of disease as the same rate reported from troops in active service. This is well illustrated by comparing the admission rate for injuries reported in 1897 with that reported in 1898. During the one year the Army was in garrison, with no thought of war and its casualties. During nearly three-fourths of the other year the greater part of the Army was exposed to all the accidents of war and had included among its injuries gunshot and other wounds received in battle. Yet the rate of admission for injuries in 1897 was 290.08 per thousand of strength, while in 1898 the rate amounted only to 209.23. Again, in time of war a comparison of the rates of admission reported from different commands is misleading unless supplemented by other information concerning the character of the admissions. This may be illustrated by comparing the admission rates for diarrheal diseases reported from the artillery and the infantry during the past year. The former had 398.42 cases per thousand of strength and the latter 333.99, and yet the infantry had been exposed to the many causes of diarrheal troubles that are encountered on field service, while many of the artillery men passed the year under conditions differing but little from those of the preceding years of peace.

When, however, some of the other rates are brought to bear on the admissions, a better understanding is obtained of their nature. Thus the 290.08 injuries reported in 1897 occasioned a death rate of 1.97 and caused a nonefficiency in the Army equivalent to 9.12 men constantly disabled in every thousand of the mean strength. On the other hand, the 209.23 cases admitted for injury per thousand of strength in 1898 were evidently of a more dangerous character, for they were associated with a death rate of 5.55 and a nonefficient rate of 13.74. In like manner the diarrheal cases of the other illustration are seen in a wholly different aspect when the death rates are used as an aid in their investigation. The death rate in the infantry was 3.91, in the artillery 0.42 per thousand of strength. In the infantry there was 1 fatal case in every 85 recorded cases; in the artillery only 1 in every 950.

The total number of deaths from all causes was 1,285, equal to a rate of 27.55 per thousand men, while in the previous year the rate was 5.11, and in the years of the previous decade 6.99. The death rate from disease was 22, and from injury 5.55. The largest item in the death rate of the Army was 9.74 deaths from typhoid fever in every thousand of strength. Gunshot wounds occasioned 3.94, malarial fevers 3.24, diarrhea and dysentery 2.14, yellow fever 1.50, and injuries other than gunshot 1.61, leaving 5.38 for distribution among all other causes of fatality to make up the total rate, 27.55.

The total number of discharges for disability was 540; 345 on account of disease and 195 on account of injury. In 47 cases of discharge for tuberculosis of the lungs the disease probably existed prior to enlistment. The ratio of discharges for all causes was 11.58 per thousand of strength, 7.40 occasioned by disease and 4.18 by injury. The rates in 1897 are given by way of comparison: All causes, 9.61; disease, 7.60; injury, 2.01.

The loss to the service by disability from disease and injury was equivalent to 30.23 days for each man of the mean strength, as compared with 13.08 days during 1897 and 13.14 days in the years 1887–96.

It will be seen from the above that while the admissions during the year were nearly twice as many as in previous years, the constant sickness was more than doubled and the death rate equal to that of the previous year multiplied by 5.4.

The admission rate of the infantry, 2,513.06, and its death rate, 39.31, were higher than those of any of the other arms of the service. The members of the Medical Department and Hospital Corps had a high death rate, 22.74 per thousand, when considered in connection with their relatively low rate of admission, 1,245.85. This was undoubtedly the result of their intimate association with typhoid-fever patients. While the admission rate for this fever in the Army as a whole was 88.56, the corresponding rate of the Medical Department was 193.41, and while the death rate of the Army from this disease was 9.74, that of the men who took care of the sick was 16.32, their rate from all other causes being only 6.42 per thousand men. The admission rate of the artillery, 2,269.52, was higher than the average of the Army. These troops garrisoned the seacoast defenses and were for the most part under conditions which did not differ greatly from those of previous years. Slight cases which would have been overlooked in the field were taken on sick report. Their death rate, however, was lower than that of any of the other arms of the service, as they were in a measure protected from many of the insanitary influences to which the others were exposed. The rates of the cavalry did not differ much from those of the Army as a whole.

The admission and death rates in the Philippines, 2,070.62 and 22.74, respectively, did not differ much from those in the United States, 2,043.01 and 20.14; but the admission rate was high in Puerto Rico, 3,350.78, compared with the death rate, 41.45, and the death rate high in Cuba, 98.16, compared with the admission rate, 2,631.76, the last rate failing, as already explained, to give expression to the facts. In Cuba there occurred 374 deaths, 127 of which were the result of gunshot wounds, 67 of yellow fever, 54 of typhoid fever, and 50 of malarial fevers. In Puerto Rico a total of 80 deaths included 44 from typhoid fever and 11 from malarial fever. In the Philippines typhoid caused 22 deaths, smallpox 6, and malarial and diarrheal diseases 5 each in a total of 66. In the United States there occurred 334 deaths from typhoid fever, 85 from malarial fever, 53 from diarrhea and dysentery, 46 from gunshot wounds, and 3 from yellow fever in a total of 765.

The admission and death rates of the colored troops were considerably larger than those of the white regiments. Admission rates: White, 2,125.18; colored, 2,430.29. Death rates: White, 27.11; colored, 33.35 per thousand of strength. Among the colored men relatively low rates for diarrhea and typhoid fever were more than offset by their high rates for malarial diseases, yellow fever, rheumatism, bronchitis, and tonsilitis. Typhoid fever was less frequent, but of greater malignancy, among the colored than among the white troops. There were recorded per thousand of the latter 93.24 cases, with 10 deaths, and among the former only 27.64, with 6.31 deaths. But although the death rate per thousand of strength was smaller among the colored men than among the whites, the gravity of the cases was greater, for while 22.1 per cent of the cases among the colored men were fatal, the corresponding percentage among the whites was only 10.7. The admission and death rates for malarial diseases were, white, 683.84 and 3.16; colored, 834.73 and 4.21 per thousand of strength, with, respectively, 0.46 and 0.50 per cent of the cases fatal. According to the statistics the colored troops were affected more extensively and with somewhat greater severity than their white comrades. This runs counter to a popular belief that the negro has greater powers of resistance against malarial germs than is possessed by the white man. His susceptibility to yellow fever also is demonstrated by these statistics: Admission and death rates: White, 9.40 and 1.04; colored, 59.19 and 7.51 per thousand of strength, with, respectively, 11 and 12.7 per cent of the cases fatal. In this comparison, however, the conditions of exposure were far from similar, for while every care was taken to protect the white regiments by removing them from the foci of infection, a colored regiment nobly volunteered for the dangerous duties of guard, police, and nursing in the yellow-fever hospitals of Siboney and Santiago.

The following tabulations enable a comparison to be made between the recorded sickness and deaths of the first eight months of the civil war, May to December, 1861, and the admissions for disease, with the resulting deaths, in the Regular Army during the Spanish-American war period, May to December, 1898.

Month.	Admissions.				Deaths.			
	1861.		1898.		1861.		1898.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
May	4,884	302.21	3,140	80.90	18	1.11	8	0.21
June	21,615	322.85	3,269	68.25	55	.82	17	.36
July	22,426	324.46	8,115	150.15	106	1.49	98	1.81
August	39,659	363.66	14,350	254.61	242	2.15	346	6.14
September	49,706	306.42	16,212	271.79	365	2.21	282	4.73
October	71,714	284.54	12,156	200.48	725	2.82	125	2.06
November	80,218	270.98	11,864	186.06	1,145	3.79	68	1.06
December	86,547	257.01	13,966	212.63	1,471	4.29	55	.84
Total	376,769	2,303.85	83,070	1,487.30	4,127	24.76	999	17.89
Mean monthly rates		287.98		185.91		3.09		2.24

That the prevalence and fatality of disease was greater during the civil war than in the Regular Army during the past year is evident from this tabulation. The highest monthly rate of admission during the civil war was 363.66, furnished by August 1861; the highest rate during the past year was 271.79, calculated from the admissions in September. The mean monthly rate during the eight months tabulated was 287.98 in 1861, while in 1898 the mean rate was only 185.98. It may be observed also that the maximum rate of last year was not so large as the mean rate of the eight months of the civil war, and, further, that the mean monthly rate of the five years of the civil war, June 30, 1861, to June 30, 1866, was higher than the mean rate of the Regular Army during the eight months which included its disastrous experience with the climatic and specific febrile diseases of the West Indies. The civil-war rate referred to was 197 per thousand men; the Spanish-American war rate, as tabulated above, 185.91.

The death rates corroborate the evidence given by the admissions. During the eight months of 1861, 24.76 men died out of every thousand men present, and during the corresponding months of 1898 only 17.89, the mean monthly rates being, respectively, 3.09 and 2.24. During the past year the monthly rate attained its maximum in August—6.14 per thousand—but thereafter it fell, until in December a rate of only 0.84 was recorded, equivalent to an annual death rate of 10.08, which compares satisfactorily with that of men of the military age in civil life, although high as compared with that which should prevail among the selected men of the Army under good sanitary conditions in time of peace. During the civil war, on the other hand, the monthly death rates continued to increase after December 31, 1861, until a maximum of 6.39 was reached in February, 1863, twenty-two months after the beginning of the war. The mean monthly death rate of the white troops during the years of the war was 3.51, of the colored troops 7.82, per thousand of strength, as compared with 2.24, the mean monthly rate of the Regular Army during that part of 1898 which included the Spanish-American war.

The total number of deaths in our armies, regular and volunteer, from May 1, 1898, to June 30, 1899, was 6,619. This is equivalent to an annual rate of 33.03 per thousand of strength, the rate for disease being 25.68. The death rate from disease among troops in the United States was 23.81; in Cuba, 45.14; in Puerto Rico, 38.15, and in Manila, 17.20, the absolute numbers being, respectively, 3,577, 928, 238, and 402. Death on transports en voyage have been included in the total of the country from which the vessel sailed.

Among the regulars in the United States there occurred 809 deaths from disease during the fourteen months, among the volunteers 2,768 deaths, equivalent, respectively, to an annual death rate of 17.43 and 26.67 per thousand of strength.

Typhoid fever was accountable for more than one-half of the deaths from disease. The total number of deaths from this disease was 2,774, equal to an annual rate of 13.84. Among troops serving in the United States the rate was 14.99, in Cuba 11.23, in Puerto Rico 26.93, and in the Philippines 5.30. In Puerto Rico the deaths from this disease (168) formed more than two-thirds of the total deaths from disease (238). In the United States the regulars lost 361 and the volunteers 1,890 from this fever, these numbers being equivalent to the respective rates of 7.78 and 18.21 per thousand of strength.

Malarial fevers are held accountable for 476 deaths, constituting an annual rate of 2.38. The rate of death from these fevers was highest in Cuba, 10.80; lowest in Luzon, 0.64—222 deaths having occurred in the former island and only 15 in the latter.

Pneumonia caused 359 deaths. The death rate from this disease was larger in the United States (2.07) than in Cuba (1.60), Puerto Rico (0.48), or the Philippines (0.51).

Diarrheal diseases were the cause of 342 deaths, equaling a rate of 1.71. The mortality from these diseases was relatively heaviest in Cuba, the rate there being 5.69.

Yellow fever caused 185 deaths, 178 of which occurred in Cuba, 6 in the United States, and 1 in Puerto Rico; and smallpox 98 deaths—90 in the Philippines, 4 in Cuba, 2 in the United States, and 2 in Puerto Rico.

Many of the deaths, however, can not be distributed among their causes until the medical records of the Volunteer Army are available for statistical study. The figures just given, together with the minor details presented in Tables VI and VII on pages 347–349 infra, are therefore subject to material change when this study has been completed.

PREVALENCE OF SPECIAL DISEASES.

Scarlet fever.

Only 12 scattered cases, with 3 deaths, were reported as having occurred among the troops. The disease appears to have been rare also among the children at permanent military stations.

Diphtheria.

Like scarlet fever, this disease was rare among the troops and rare also among the children of army families. During the year 1898 only 17 cases, with 2 deaths, occurred among the troops, and since the close of that year only two special reports relating to this disease have been received. The first of these came from Fort Logan, Colo. Three men of the First New York Infantry were transferred December 22, 1898, to the hospital at this point while en route with their regiment to New York City, N. Y., from Honolulu, Hawaiian Islands, via San Francisco, Cal. These men were suffering from typhoid fever and were doing well when, on January 4, 1899, thirteen days after admission, they became affected with sore throat. Two days later an exudate was developed, which gave positive results on bacteriological examination. They were immediately isolated and treated with antitoxin, two nurses in attendance receiving immunizing doses. One of the patients died on January 9; the others recovered. There was no spread of the disease from these cases, and, as bearing on the derivation of the infection, it was stated that for years prior to this time there had been no known case of diphtheria at the post or its vicinity. The second report came from the hospital ship *Relief*, which at the time, May, 1899, was acting as a floating hospital in Manila Bay. A case which proved fatal was admitted from the front. Every precaution was taken to prevent the spread of the infection, but 6 mild cases were developed among the patients on board. The presence of the Klebs-Loeffler bacillus was demonstrated in all.

Measles.

During the calendar year 1898 1,170 men belonging to the Regular Army were reported as sick with measles, but, fortunately, only 12 of the cases were fatal. The rate of admission was 25.09 and the death rate 0.26 per thousand of strength. The disease appeared at a number of posts during the early months of the year. In these instances the infection was generally brought from a neighboring city by the school children belonging to the garrison. Prompt action by post surgeons was usually successful in confining the disease to the house or quarters primarily infected. During the war cases were so common among the volunteer regiments and among the recruits required o raise the regular regiments to their war strength that scarcely a camp escaped visitation. Every field division hospital had its tent pavilion ward for the isolation of those affected with measles. There s no doubt that the preventive measures taken by medical officers did much to restrict the spread of the infection. Thus, in the Second Army Corps the disease became really epidemic in only one regiment, he Thirty-fifth Michigan Infantry, although the infection was present n every regimental camp of that large command. In this general prevalence of measles the army transports did not escape.

Under date May 18, 1899, Manila Bay, Lieut. and Asst. Surg. Eugene H. Hartwell, United States Army, reported an outbreak among the roops on the *Warren* during her voyage from San Francisco, Cal. Five cases appeared before reaching the Hawaiian Islands. These were left at Honolulu, but 55 others had to be treated during the remainder of the voyage, although every effort possible under the conditions was made to restrict the spread of the disease—by isolation and disinfection. No death occurred.

The disease was generally of a mild type, but at Columbus Barracks, Ohio, it assumed a decidedly malignant character. The infection was introduced about the middle of December, 1898, and from that ime to May 16, 1899, there occurred in the garrison 74 cases, of which 12 proved fatal, mostly from pulmonary complications. During his period the post was in a most unsanitary condition (see page 32) from overcrowding with men who were broken in health by the hardships of the Cuban campaign and with undisciplined recruits, who had yet to learn that part of a soldier's duty which relates to personal cleanliness. In December, 1898, there occurred 3 cases; none fatal. It is believed that the infection was brought from the city of Columbus, where the disease was then prevalent, particularly in that part of the town most frequented by soldiers. In January, 1899, 18 cases were reported, 3 of which ended fatally. The disease was so scattered among the several barracks as to warrant the belief that the infection in each case was derived from the city. During this month two battalions of the Seventeenth Infantry left for New York en route for the Philippines. These left cases of measles at Governors Island, and had other cases under treatment while on their voyage.

On February 15 the third battalion started for the port of New York, leaving only about 400 men in the garrison, consisting of invalid soldiers, rejected recruits, and one company of the Seventh Infantry as a guard for public property. On account of this depopulation the month furnished only 8 cases of measles, none fatal. In March and April recruits poured in rapidly, until a strength of 1,647 men was reached. Only 2 cases occurred in March, with no death, but in April the disease broke out with unusual malignancy, giving 39 cases with 9 deaths. This appears to have exhausted the susceptibility of the garrison to the infection present, for in May only 4 cases were reported, none fatal. Forty-four of the 74 cases were received from barracks No. 57, occupied by about 540 men. Recommendation was made by the post surgeon, Lieut. Col. B. F. Pope, deputy surgeon-general, for the disinfection and renovation of this building, the men meanwhile to be quartered in certain new wooden barracks and hospital tents properly framed and floored. This was carried into effect. Efforts were made to control the spread of the disease by burning up infected mattresses and pillows and disinfecting their covers, blankets, and infected clothing. Recommendation was made that no men who had not already had measles be sent to the post from the various recruiting stations. So deeply was Lieutenant-Colonel Pope impressed with the malignancy of this outbreak that he urged a modification of the recruiting regulations, so as to require the rejection of all applicants for enlistment who can not furnish evidence of their probable immunity from this disease by virtue of a previous attack.

CEREBRO-SPINAL MENINGITIS.

During the calendar year 1898, 32 cases of cerebro-spinal meningitis were recorded among the troops of the Regular Army. Fourteen of these terminated in death, while 6 were discharged for disability. Nearly one-half of the cases occurred in December, the others being scattered irregularly over the other months. Thus, in each of the months January, March, September, and October, there was 1 case; in May, June, and August, 3 cases each; in July, 5, and in December, 14 cases. No case occurred during February, April, and November.

Some cases of this disease are specially mentioned in reports received since the close of the calendar year. One case occurred in a soldier of the Seventh Infantry and one in a child of 3 years at Fort Wayne, Mich., in January, 1899, and three in the Third Cavalry at Fort Ethan Allen, Vt., in February and March. Again, references are made occasionally to the occurrence of such cases in the history of certain hospitals. Lieut. Carl R. Darnall, assistant surgeon, United States Army, in his history of the Fourth Corps reserve hospital, Huntsville, Ala., states that 5 cases, all fatal, were treated. The diagnosis was in every case confirmed by post-mortem observation. Three of the cases were fulminant, the patients dying by the fourth day; the others lingered for from two to four weeks before ending in fatal coma. In the hospital of the Second Division, Fourth Army Corps, at Anniston, Ala., 13 cases, 7 fatal, were reported.

Three cases occurred on the transport *Manitoba* while en route with the Fourth Tennessee Infantry from Savannah, Ga., to Casilda, Cuba, early in December, 1898. A man belonging to Company H embarked December 1, not feeling well. Next day he was taken into a hospital extemporized on the hurricane deck. He died on the 7th, the case being regarded by the medical officers on board as one of cerebro-spinal meningitis. The second case, from Company G, was taken into hospital December 3, as one of seasickness, but he became unconscious shortly afterwards and died on the 6th. The third patient, from Company E, was admitted December 4 and died on the 9th. A board of five medical officers, Maj. John C. Martin, brigade surgeon of volunteers, presiding, reported its inability to determine the cause of the outbreak. The transport had been a cattle ship, but she had already made six successful voyages with troops. It was acknowledged that after the first four days of the voyage the men became somewhat careless as regards the cleanliness of their quarters, but the crew of the transport, numbering 116 men, most of whom occupied more restricted quarters than those assigned to the troops, were perfectly free from sickness. The board recommended that the troops be landed and quartered on shore and that the ship be thoroughly cleaned and disinfected.

Nine cases were reported in December, 1898, and January, 1899, at Fort Crook, Nebr. The barrack buildings were overcrowded at the time, but this does not appear to have had any bearing on the spread of the disease, for, with one exception, the men affected belonged to different companies and lived in different quarters. Two had suffered from malarial fever in Cuba, but at the time of the cerebro-spinal attack no malarial organism was discovered in either of them. The others were recruits recently joined from various recruiting stations. All but one belonged to the Twenty-second Infantry. The 9 cases resulted in 6 deaths, 2 discharges for disability, and 1 return to duty, as follows:

Case 1.—Company M; enlisted in Kentucky December 19, 1898; arrived at post December 21; admitted to hospital December 27; died December 30.

Case 2.—Company A; enlisted in Kentucky November 29; arrived at post December 11; admitted to hospital December 28; died January 6, 1899.

Case 3.—Company H; enlisted in Ohio November 14; arrived at post November 17; admitted to hospital December 29; returned to duty January 13, 1899.

Case 4.—Company H; enlisted in Ohio November 11; arrived at post November 15; admitted to hospital December 31; discharged May 7, 1889, on account of cerebro-spinal meningitis, terminating in blindness from extension of inflammatory exudate to optic nerves; loss of sight total in left eye, can not distinguish objects with right eye.

Case 5.—Company G; rejoined post from furlough November 30; admitted to hospital January 16, 1899; died January 18.

Case 6.—Company E; enlisted in Ohio December 22; arrived at post December 26; admitted to hospital January 17, 1899; discharged for disability March 4; entire loss of hearing in both ears.

Case 7.—Company B; enlisted in Indiana December 27; arrived at post December 28; admitted to hospital January 22, 1899; died January 27.

Case 8.—Company I; enlisted in Texas in January, 1899; while in hospital recovering from a mild attack of measles was suddenly seized, February 1, with the characteristic symptoms of cerebro-spinal meningitis; died February 4.

Case 9.—Company B, Sixteenth Infantry; in hospital January 28, 1899, with an apparent recrudescence of malarial fever. Symptoms of cerebro-spinal meningitis were manifested on February 1; died February 24.

The symptoms were characteristic in all, and the post-mortem appearances in the cases examined were such as are usually found in this disease. Lieut. R. P. Strong, assistant surgeon, United States Army, made a careful clinical and post-mortem record of the first seven of these cases. In one instance, case No. 5, puncture between the third and fourth lumbar vertebræ resulted in the withdrawal of 30 c. c. of cerebrospinal liquid, but no favorable impression was made on the progress of the disease. Cover slips from this liquid showed a fair number of diplococci mostly situated inside of leucocytes, which were very numerous and chiefly of the polymorphonuclear variety. Slips from some of this liquid which had been in the incubator for some hours showed many diplococci, which were decolorized completely by Gram's solution. Concerning the bacteriology of this case, Lieutenant Strong stated:

> At the autopsy cover slips were taken from the purulent fluid in the pericardial cavity, from the blood in the heart, from the lung, spleen, liver, kidney, and from various portions of the brain and cord. Those from the blood, lung, spleen, liver, and kidney were negative. Those from the pericardial cavity showed a fair number of diplococci, mostly in pairs and inside of leucocytes, generally only one or two pairs in each cell body. These diplococci decolorize by Gram's solution, and have the morphology of the diplococcus intracellularis-meningitidis. Cover slips from the exudate, along the base of the brain, show numerous diplococci, mostly inside of cells. Those from the cord show a less number of the same diplococci.
>
> Cultures were made from the lung, spleen, and kidney, from the blood, pericardial fluid, and from the exudate on the brain and cord. From the lung, spleen, liver, kidney, and blood no growth was obtained. Cultures from the pericardial cavity on agar were negative, although large quantities of the purulent pericardial exudate were inoculated in the plates. Various cultures from the exudate along the base of the brain and cord on agar were negative. Cultures from the exudate on Loeffler's blood serum, however, revealed after forty-eight hours several small colonies about 3 mm. in diameter. These colonies were round, slightly raised, whitish in color, and soft and viscid looking. Cover slips from these colonies showed numerous diplococci in pairs, fours, and in clumps; a number of swollen forms

were also seen. Further transplantations from these colonies on agar, glucose agar, and bouillon (the only media on hand) gave no growth after fifty-five hours.

It is to be regretted that no growth was obtained on the cultures from the pericardial cavity; nevertheless, as the diplococci were found in cover slips decolorizing by Gram's solution (not alone, however, a conclusive sign), and with the characteristic morphology of Weichselbaum's organism, and as the cultures were inoculated with large amounts of the purulent exudate and nothing grew, there can be little doubt but that I was dealing with the diplococcus intracellularis-meningitidis in this pericardial fluid and that it was the causative agent in the purulent pericarditis.

A case was admitted May 2, 1899, from the transport *Buford* into the hospital at San Juan, P. R. At first there was headache with delirium out of proportion to the temperature, and with purplish spots over the knuckles, elbows, and knees, followed after a few days with stiffness of the muscles of the neck and retraction of the head, with mild delirium. The retraction increased, tenderness was developed along the spine, the pupils became dilated, and the pulse slower. On the seventh day after admission spinal puncture permitted several ounces of clear yellowish fluid to be drawn off. Cover slips from this showed the diplococcus intracellularis, which grew in pure culture on agar. A marked amelioration of all the symptoms followed the drainage from this puncture, the temperature falling to 98.8° on the second day thereafter. A low febrile action recurred, however, with delirium, and death took place suddenly from asthenia. The surface of the brain and the sulci were coated with a gelatinous exudate, which, on the base and along the cord became purulent in character. Smears from this showed the diplococcus and the large cells described by Barker and Flexner in the report on the Frostburg epidemic. Lieut. Walter Cox, assistant surgeon, United States Army, who treated and reported the case, invited attention to the marked improvement which followed the Quincke puncture, suggesting it as an expedient always worthy of a trial in these dangerous cases.

SMALLPOX.

Although during the past year the regular troops were exposed to the contagion of smallpox both in the United States and in the islands, there occurred among them only 19 cases of the disease, 7 of which were fatal—in the United States, 1 case; in Puerto Rico 2 cases, 1 fatal, and in the Philippines 16 cases, 6 fatal. No doubt a larger proportional number of cases will be found in the reports of volunteer commands, on account of hurried and insufficient vaccinations.

Smallpox appeared among the troops quartered in Manila, P. I., about September 3, 1898. As the attack on the city was made August 13, it is evident that the first cases must have received the infection within a few days after the troops occupied the place. A smallpox hospital was established at a safe but convenient distance from the First Reserve Hospital, and arrangements were made to protect the command by vaccination. Cases continued to appear during the following months, but on March 31, 1899, the chief surgeon reported that all danger from the disease was over. During these seven months 151 cases were reported as variola, the malignancy of the disease being evident from the fact that 77 deaths occurred among these cases. In addition to these virulent cases 85 mild cases were reported under the title varioloid, making a total of 236 cases of smallpox, with 77 deaths.

On April 20, 1899, the transport *Sherman* arrived at San Francisco, Cal., and reported the occurrence of a fatal case of smallpox during her voyage from Manila, but with no apparent spread of the infection.

The sick were sent to the general hospital. One case of smallpox appeared among these men. The case was removed to the quarantine station at Angel Island, and the men who had been exposed were kept in isolation until the period of incubation had passed. A private of the Twenty-fourth Infantry was taken sick with smallpox at the post hospital at the Presidio on May 18, 1899. He was promptly isolated, and there was no further spread of the disease at this post. Meanwhile a civilian employed on the Folsom street wharf, near where the *Sherman* landed, was taken with smallpox and sent to one of the city hospitals by the civil authorities. Following this, several other cases developed in the city, with some deaths. A rigorous vaccination of all troops at the posts and camps in the Department of California was then instituted, and no case of the disease appeared among the troops.

At Fort D. A. Russell, Wyo., in February, 1899, two colored recruits received from Cincinnati, Ohio, became affected with smallpox about a week after their arrival. They were immediately isolated and properly cared for. Their bedding and clothing were destroyed, the barrack rooms were disinfected, and the men who had been specially exposed were separated from the others and held under observation during the period of incubation. Meanwhile the command, including the civilian attaches, was revaccinated. These measures limited the spread of the disease to two mild cases of varioloid from each of the primary cases. As the importation of the infection from Cincinnati was clearly established, the recruiting office in that city was closed temporarily on my recommendation, and measures were taken to put the quarters of the recruiting party in good sanitary condition. The office was then reopened for the enlistment of white troops, as the reports of the city health officer showed smallpox to be present only in certain localities occupied by colored people.

Early in November, 1898, systematic measures were taken by Brig. Gen. Leonard Wood, United States Volunteers, in command of the Department of Santiago, for stamping out an epidemic of smallpox in the District of Holguin. This district comprises about one-third of the area of the Province of Santiago, extending from the boundary of Puerto Principe eastward about 200 miles to the river Mayari and from the north coast 70 miles south to the river Cauto. Capt. R. S. Woodson, assistant surgeon, United States Army, was placed in charge of this sanitary work. Some American medical men were assigned to him for the duty of superintendence, but the details of the work were carried out by Cuban physicians. Pest hospitals were established, in which 1,185 cases were collected for treatment. The mortality was 10.1 per cent. Four per cent of the cases were hemorrhagic, 40 confluent, 23 semiconfluent, and 33 discrete. Three of the hemorrhagic cases recovered. Only 2 per cent of the whole number had a record of previous vaccination, and of these none ended fatally. The low rate of fatality was credited to the free ventilation afforded by the open sheds used as lazarettos. The suspicions entertained by the natives against isolation hospitals and vaccination would have interfered with the success of the undertaking but for the earnest support of the Cuban doctors engaged in it. Vaccine lymph on ivory points gave 80 per cent of successful vaccinations. A sanitary corps of 100 men attended to the work of disinfection. The Second United States Volunteer Infantry, Col. D. H. Hood, furnished guards for the hospitals and distributed rations. No case of the disease occurred among its members. The work was concluded early in January, 1899, but the medical officers connected with it remained on duty for a few weeks longer to insure its efficiency.

Maj. J. Van R. Hoff, chief surgeon, Department of Puerto Rico, submitted, March 11, 1899, a report on the necessity for vaccinating the inhabitants of the island, the means to be employed, and the estimated cost of the undertaking. The records of the chief surgeon's office permitted a fair idea to be formed of the wide dissemination of smallpox in the department. The disease was not considered to be any more prevalent at that time than usual; but the fact that the military government received reports through its military officers brought the number of cases more closely to the attention of the authorities. Between December 15, 1898, and February 11, 1899, 554 cases of smallpox were reported from 16 different towns and villages. The disease existed in every direction, and was a constant menace to the people and to the material interests of the island, a quarantine of fifteen days having been declared against Ponce by the neighboring islands.

It was the intention to establish five grand vaccinating divisions, each under a medical officer of the Army, whose duty it would be to see that the 200,000 people, more or less, in his division were effectually protected, while the actual work of operating would be done by Puerto Rican physicians, where they could be obtained, for it was considered that they would be more acceptable to the people, and if so employed their interest in the undertaking would be stimulated. The expense of vaccination was estimated at about $15,000, with $5,000 for the production of vaccine on a farm. This farm was, in fact, already established at Coamo, under the direction of Maj. Azel Ames, surgeon, United States Volunteers. Young cattle were freely offered by the farmers of the island for use in the production of vaccine, and at my request a supply of tuberculin was furnished by the Bureau of Animal Industry. Concerning this vaccine farm Inspector-General Breckinridge reported that it was "one of the best energized and organized and, despite the considerable difficulties, the most successful and thorough undertaking that has characterized the American occupation."

Orders were issued from the headquarters of the department requiring all the inhabitants to present themselves for vaccination when notified, and the alcaldes of the several jurisdictions were called upon to use all their authority to secure prompt compliance on the part of the people. It was ordered, further, that after the completion of the official vaccination in a district no person belonging to that district would be admitted to any school, public or private, nor be permitted to travel by any public conveyance, to visit any theater or any place of public resort, to engage in any occupation related to the public, or to receive any employment unless possessed of a duly attested official certificate of vaccination.

The following regulations were issued for the guidance of those concerned:

Directors of vaccination.—Directors will establish their offices at their division headquarters. (See General Orders, No. 7, current series, headquarters Department of Puerto Rico.) When a director is absent from his office, he will designate someone to take charge of the same.

All vaccine virus for the division will be sent to the director's office and will be distributed from there. Records will be kept of each receipt of virus and of each distribution, the date, hour, amount, by whom, and to whom delivered being noted.

The director will notify the alcalde of a municipality two weeks before an intended visit of the vaccinating party, requesting his cooperation, and asking him to obtain the necessary vaccination rooms and supplies, resident physicians as vaccinators, recorders of vaccination, and also to make suggestions in reference to most central places in his district for performing vaccinations.

Two days before the work is to begin in an alcaldia the director will visit the place, consult with the alcalde, see the local practitioners selected to vaccinate, instruct them in their work, and see that suitable rooms have been obtained and that their furniture and equipment are complete and ready for use. He will request the alcalde to see that order is maintained in the vicinity of the operating rooms.

The director will receive daily reports from his inspectors, showing number of persons vaccinated during the day, the number and names of the vaccinators employed, the hours of work, the amount of virus on hand, and the amount needed for the following day.

The director will send a weekly report to the chief surgeon at San Juan, which shall give the number and names of vaccinators employed during the week, the total number of persons vaccinated during that period, the quantity of virus, whether or not the quantity has been sufficient, and the probable length of time necessary to complete the work in the district; also the number of certificates of vaccination presented and approximately the number of people who have had smallpox.

Inspectors of vaccination.—Inspectors already designated in General Orders, No. 7, or to be detailed from these headquarters will be in immediate charge of the work done at the vaccinating stations. They will see that the work of the operators is properly performed, that the operators and assistants are at all times neat and clean, and that the equipment of utensils, instruments, and solutions are complete and properly cared for.

Inspectors will examine all persons presenting themselves for vaccination who appear to be suffering from acute febrile or debilitating diseases or from skin eruptions, and they or the director shall decide whether or not vaccination shall be performed in these cases.

Inspectors shall see that all who are vaccinated are instructed in reference to the after care of the vaccinated areas.

Inspectors will have charge of the records of vaccinations and will see that the work of the recorders is properly performed. They will keep a record of the names of vaccinators and recorders, with the hours of work performed by each. They will send daily reports to the director, giving the names of the people vaccinated during the day, with the names of vaccinators and recorders, and the number of hours' work performed by each, the amount of virus on hand, and the amount needed for the following day. They will also report anything of importance or interest occurring in connection with the work of each day.

Noncommissioned officers.—The acting hospital steward shall have immediate charge of all the property of the detachment, including the transportation, if any, and the records for which the inspector is responsible, and he will also be in charge of the hospital corps orderlies. He will usually receive all vaccine left over at close of each day's work and distribute it to vaccinators each morning. He will also receive the vaccine from the director's office each day, noting the hour, amount, and by whom brought. He shall see that the orderlies properly attend to their duty, that they are neat and clean, and that the operating rooms are each morning clean and in readiness for the work of the day.

Checks should be issued to the people in the order in which they come to place of vaccination, so that those who come first shall be first vaccinated.

The vaccinators.—The vaccinators, whether resident physicians or others, will present themselves at the designated vaccinating station each day at 8 a. m., and again at 2 p. m. They will wear white coats, and always be neat and clean and strictly attentive to duties, carefully observing all the rules and regulations for conducting vaccinations.

Orderlies (Hospital Corps men).—The Hospital Corps men on this duty will act as orderlies, disinfectors, recorders, etc., as the service may develop need of them. They shall be under the direction of the inspector and noncommissioned officer, and shall have charge of the rooms, furniture, utensils, solutions, etc.

Interpreters.—Interpreters when on duty will be constantly on hand during working hours, and shall attend strictly to their special duties.

Recorders.—Recorders shall enter in the books kept for the purpose the name, sex, color, age, and occupation of each person vaccinated, and also the virus used and date of its receipt. Each recorder will be responsible for the neatness and completeness of his books and the legibility of the writing. All records shall be kept in ink.

Directors will communicate freely with the chief surgeon on all matters pertaining to their work. In addition to their other duties, they will make or cause to be made a careful sanitary inspection of each municipal district, reporting in detail the results thereof. They will in this connection note the population of the cities, towns, and hamlets, and will report the name of every physician and his address.

The foregoing rules and regulations may be departed from when in the judgment of the director the best interests of the service will thereby be subserved.

Instructions for vaccinators.—1. The hours of vaccination will be from 8 a. m. to 11 a. m., and from 2 p. m. to 5 p. m.

2. Vaccinators will be dressed in clean, white clothing at all times while at work. Before beginning work, and frequently during the progress of the same, they will disinfect their hands with soap and water, using a nailbrush, and follow this by immersing the hands in bichloride solution, 1 to 1,000. Vaccinators are responsible for the cleanliness of the instruments and materials used by them and for the efficiency of their work.

3. Before an operation the skin of the arm will be washed thoroughly with soap and water, then washed with bichloride solution, 1 to 1,000, and dried with a clean towel.

4. Vaccinations will be done on the left arm at about the middle of the external surface, and in two places a half inch apart. The skin is to be scarified in each place over an area of about 1 cm., or one-third inch, until a little serum exudes. Scarification may be done with a cambric needle or with a lancet. After scarifying, the vaccine point will be dipped in sterile water and then thoroughly rubbed over the scarified surface. The arm should remain uncovered until it dries, and no person should leave the room until the arm is dry.

5. If needles are used for scarifying, they should first be boiled for half an hour and then kept in carbolic solution, 1 to 40, until needed. A needle should be used for but one vaccination in a day. At the end of each day the needles used are to be collected and disinfected, as above indicated, for use on the following day. If a lancet is used, immediately before each operation it shall be dipped into carbolic solution, 1 to 20, and then passed through the flame of an alcohol lamp.

6. Each vaccinated person should be instructed that he is not to scratch the sore, nor to injure the vesicle, nor to remove the scab, but to let it drop off. He should be directed to keep the body clean, and if the arm becomes painful he may cover the sore with a cloth wrung out of very hot water.

7. All persons presenting themselves for vaccination who appear to be suffering from any febrile or exhausting affection, or skin disease which would cause complications, should not be vaccinated until their cases have been passed upon by the inspector.

8. All persons should be vaccinated as nearly as possible in the order in which they present themselves.

9. All used vaccine points must be preserved and returned to the vaccine depot at Coamo.

This general vaccination of the population of Puerto Rico was begun in January, 1899, and carried to a successful conclusion before the end of the fiscal year. (See page 191.)

It is understood that the occurence of smallpox among the troops in the Philippines gave rise in England, where the protective influence of vaccination was under discussion at the time, to the claim that, as vaccination was compulsory in the United States Army and carried out under military rules, the presence of the disease among the men showed the inefficiency of the process. This claim of the opponents of vaccination is not well taken. On the contrary, the history of vaccination and smallpox in the United States Army suffices of itself to demonstrate that protection from the disease is proportioned to the care with which the protective operation is performed.

The intention of the United States Army Regulations is to afford protection against smallpox to every enlisted man by a careful vaccination at the time of his entry into service. Paragraph 843 requires that—

> As soon as a recruit joins any rendezvous, regiment, or post he will be examined by the medical officer to ascertain whether vaccination is required. In all cases where there is not unmistakable evidence of successful vaccination within a reasonable period the operation will be performed immediately.

Paragraph 846 provides that before recruits are forwarded from a rendezvous to regiments the commanding officer will cause the date and result of last vaccination to be entered on the descriptive and assignment card.

Under these regulations, which have been faithfully carried out, the soldiers of the United States Army have received efficient protection from smallpox. Although this disease has prevailed in many parts of the country during the past fifteen years—1883 to 1897—and frequently with epidemic violence among the civil population in the immediate vicinity of military posts, there occurred only 20 scattered cases, of which 4 were fatal, in a mean strength of 25,000 men.

At the outbreak of the Spanish-American war a large volunteer force was hastily organized, and the regiments of the Regular Army were as hastily recruited up to their strength on a war footing. The Army was in a few weeks increased from 28,000 to 280,000 men. Under these conditions it is probable that the requirements of the regulations as to vaccination were not as carefully fulfilled as in time of peace. It will be observed that the necessity for vaccination is left by the regulation to the discretion of the medical officer. In May, 1898, smallpox prevailed to a considerable extent among the colored people in many parts of the Southern States. It was known to be common also in Cuba and Puerto Rico. The medical officers who were present at the muster in of regiments raised in the Eastern States and who expected to be camped in the South and to see active service in Cuba and Puerto Rico were probably more careful in carrying out the provisions of paragraph 843, Army Regulations, than the medical officers of Western regiments, who did not have in anticipation an immediate exposure to infection. At all events, few cases occurred among the troops in Cuba or Puerto Rico. The regiment which occupied the Holguin district of Cuba during the stamping out of the disease, which at the time was prevailing extensively among the native population, did not have a single case, although its members were constantly exposed to infection during the aggregation of the sick in extemporized pesthouses and the disinfection or destruction by fire of vacated houses.

On the other hand, a number of cases appeared among our troops shortly after their entry into Manila, P. I. These cases occurred mostly among men who had been visiting the huts of the natives, in many of which smallpox of a very malignant character was prevailing. On the recommendation of Chief Surg. Henry Lippincott, Major-General Otis, November 19, 1898, issued orders requiring commanding officers of regiments, battalions, companies, and detachments, and surgeons in charge of hospitals to take immediate steps to secure the vaccination or revaccination of all enlisted men under their supervision. Every enlisted man of the command who had not been successfully vaccinated within the past six months, as shown by company records or within the personal knowledge of his officers, was required to be vaccinated at once (provided he was in physical condition to endure it), and should the operation not prove successful, it was to be repeated, at intervals of two weeks, as often as in the judgment of the surgeon in charge of the organization it was deemed necessary to fully protect against smallpox, but not less than three unsuccessful vaccinations from date of this order would be recognized as sufficient protection. These orders were promptly carried into effect, but the vaccine received from San Francisco, Cal., appeared to be inert in so many cases, owing probably to the heat and length of time occupied by the voyage, that other sources of supply had to be discovered. The chief surgeon succeeded in procuring some from Japan, but the best results were obtained ultimately from vaccine prepared by the board of health of the city of Manila. Meanwhile a knowledge of the danger to which new troops were to be exposed on their arrival in the Philippines led to a careful examination and vaccination of the men prior to their embarkation at San Francisco, Cal., and the Army medical authorities at Manila reported that the troops on reaching that place were again inspected and all doubtful cases were revaccinated with fresh lymph before or immediately after leaving the ship.

These measures were successful in preventing the spread of the disease among the large number of troops then quartered in and around Manila.

As contrasted with these results of vaccination, isolation, and disinfection in accordance with modern sanitary methods may be instanced the ravages of smallpox early in the present year among the Indians of the Moqui Reservation, in Arizona. So many of these Indians resisted the efforts of the Interior Department to protect them and to prevent the infection from spreading to other villages that the assistance of the War Department was requested. Two villages, aggregating 900 people, had been visited by the pestilence, which, owing to the opposition of the villagers, destroyed 184 out of 590 affected. I considered it proper to recommend that the efforts of the agent to destroy the infection and protect the other villages be sustained, but that the work should be done by immune civilians employed for the purpose, under the supervision of a competent physician, and that troops should be used only to enforce the orders of the agent in charge.

YELLOW FEVER.

During the calendar year 1898 there were reported among the regular troops 604 cases of yellow fever, of which 70, or 11.6 per cent, were fatal—576, with 67 deaths, in Cuba, and 28, with 3 deaths, in the United States. Most of the cases occurred at Santiago—in July, 462, with 25 deaths, and in August, 120, with 40 deaths, making 582 cases in the army of invasion, the 65 deaths constituting 11.2 per cent of the cases. Twenty-two cases, 5 of which were fatal, were scattered through the remaining months of the year.

It is very certain that these figures fail to give an adequate idea of the prevalence of this fever in General Shafter's army. In July and August, 1898, medical officers on duty with regiments in that army had few or no facilities for keeping accurate records. (See p. 232.) On this account some of the cases treated in regimental camps were never reported. Indeed, it may well be believed that with so much prostrating sickness among them many men suffering from mild attacks did not even report themselves as sick. And when we consider the great prevalence of well-pronounced malarial fevers, the likelihood of some of the yellow-fever cases appearing on the records as malarial remittents can easily be appreciated. Major Havard, chief surgeon of the Fifth Army Corps, found 300 men sick out of a strength of 740 in the Seventh Infantry, when camped near Cuevitas, about the middle of August. Two hundred and fifty of these were reported as affected with malarial fever and diarrhea, and 50 with yellow fever. Again, some of the medical reports, which describe the existing conditions in general terms, characterize the yellow-fever attacks as being of a mild type, with a mortality scarcely so large as that of the malarial fevers which were so common at the same time.

It is probable that many of the so-called mild cases of yellow fever were in fact cases of malarial fever. Indeed, the alarming reports received as to the general prevalence of yellow fever among our troops shortly after the surrender of Santiago were not sustained by subsequent events. It is now evident that the fever which prevailed so extensively in the Fifth Army Corps as a result of exposure in the trenches and in camps located in an intensely malarial region was in fact a severe type of malarial fever, due to the æstivo-autumnal parasite.

The transfer of this army to the United States was effected without the occurrence of a disastrous epidemic on any of the crowded transports and without the introduction of yellow fever into this country, at a period of the year when there were still two months of a possible yellow-fever season before us.

The experience at Santiago in 1898 was of the utmost value in demonstrating the necessity for constant vigilance to protect the troops comprising the army of occupation which embarked for Havana, Cuba, from Savannah, Ga., in December of that year. I lost no opportunity of urging upon medical officers the imperative need of adopting every sanitary precaution in their camps, barracks, and surroundings, and impressed upon them the importance of detecting and isolating the first case and of having all arrangements made for promptly abandoning an infected station. These instructions were promulgated in different forms in the various military departments of the island, and, what is more to the purpose, they were carried into practice with satisfactory results in the three instances of infected garrisons which have been reported during the present yellow-fever season. These occurred at Santiago de Cuba, Puerto Principe, and Cabana Fortress. Maj. L. C. Carr, surgeon, U. S. V., has reported concerning the first as follows:

SANTIAGO DE CUBA, *October 15, 1899.*

SIR: I have the honor to submit the following report on the epidemic of yellow fever in Santiago de Cuba and its vicinity, beginning June 15, 1899:

On that date a civilian, Henry Godding, was taken sick at the Army and Navy Saloon, No. 23 Enramadas street. The diagnosis was yellow fever. He was sent to the yellow-fever hospital and died next day, June 16. The post-mortem examination confirmed the diagnosis. This was the first case. The last case which occurred in the city of Santiago or its immediate vicinity was that of a Spanish actor, Carmelo Medina, living at No. 5 Jaguey street, of whose sickness we learned only about two hours prior to his death. He died at noon on September 24.

Two other cases have been reported as having occurred at Cristo since that date. These cases, both on October 1, are accounted for in the body of the report. On October 9 the steamship *Flandria*, chartered by Agent Taylor of the Mobile and Ohio Railroad, reached this port, having on board two cases of yellow fever, one taken sick on the morning of the 8th and the other on the 9th. The *Flandria* left Mobile on September 30, reaching Havana on the morning of October 5. She remained in that harbor until the night of the 6th, when she left for Santiago. These two patients were placed in the yellow fever hospital without having been in contact with the city in any manner. On this date they are convalescents. Havana had sent us another case earlier in the epidemic, that of Percy Nibbs, who contracted the fever there and was removed from the steamship *Sutherland*, of which vessel he was captain, a few hours after she arrived in this harbor. He died within twelve hours after reaching the yellow-fever hospital.

Following the case of Henry Godding, which case was discovered on June 15, five other cases were diagnosed yellow fever on the next day, June 16, and were sent to the United States general hospital from the barracks adjoining.

On June 17 an inspection was made of the barracks. They were pronounced infected, and the following letter was sent to the commanding officer thereof by the assistant adjutant-general of the department:

"SIR: The department commander directs that enlisted men be not allowed to leave the limits of the post except on duty, and that the necessary roll call and other checks be established to secure strict compliance with this requirement.

"Also that the guardhouse and band quarters at the post be at once thoroughly renovated and disinfected, the walls being first scraped and subsequently properly treated with disinfectants, and then whitewashed or calsomined. The foregoing instructions to be complied with without delay. If possible the band barracks should be immediately vacated.

"The measures prescribed are considered necessary to protect the health of the command."

The chief surgeon urged the necessity of vacating the entire barracks, recommending that three companies and the band be sent at once into the country and only one company kept on the outside parade grounds, as far as possible from the barracks.

Next day, June 20, the following order was issued:

HEADQUARTERS DEPARTMENT OF SANTIAGO,
ADJUTANT-GENERAL'S OFFICE,
Santiago de Cuba, June 20, 1899.

COMMANDING OFFICER,
Santiago Barracks, Santiago, Cuba.

SIR: The chief surgeon of the department having this day reported that the barracks occupied by the Fifth U. S. Infantry are undoubtedly the source of infection of yellow fever, nine cases having occurred there, the department commander directs immediate compliance with the recommendations stated below:

1. Prompt and immediate evacuation of the barracks and the placing of troops in camp under canvas, isolating the various organizations one from another as much as possible.
2. That Companies M and C Fifth U. S. Infantry, be sent to the site which may be selected for them near the old camp of the Fifth U. S. Volunteer Infantry, and that the two remaining companies and the band be placed in camp on the grounds directly in front of the barracks, but nowhere nearer than 100 feet from it.
3. Clothing and such effects as the men of Companies M and C are to carry to their camp to be first disinfected on the marine-hospital ship, in the manner prescribed by the chief surgeon. The other organizations to be disinfected later in the same manner.
4. As soon as the troops have left the barracks, the latter to be thoroughly disinfected under medical supervision in the manner already indicated by the chief surgeon.

Very respectfully,

GEO. ANDREWS,
Assistant Adjutant-General.

This evacuation was commenced on June 21. On the day that the complete evacuation of the barracks was finally agreed upon it was decided that two companies were to leave the barracks, and after complete disinfection they were to repair to a camp on the Morro road, and that on the next day the remaining two companies and band were to be disinfected and put into camp not closer than 100 feet to the barracks. This programme was not carried out, however, for on that same night, June 21, the entire command with their infected clothing was moved out on the parade ground in front of the barracks and encamped there. The manner of this movement was so contrary to orders that it called for the following letter from the adjutant-general of the department:

HEADQUARTERS DEPARTMENT OF SANTIAGO,
ADJUTANT-GENERAL'S OFFICE,
Santiago de Cuba, June 22, 1899.

COMMANDING OFFICER,
Santiago Barracks, Santiago, Cuba.

SIR: Information is received that Capt. W. F. Martin notified the general hospital that 20 of his command would report there at 8 o'clock p. m. yesterday for disinfection, but that no men so reported, and consequently the hospital men waited there all night, prepared to do this work, to no purpose.

The department commander directs that immediate and full report be made of the circumstances of the case, as considerable inconvenience and dissatisfaction has resulted from the course pursued by Captain Martin.

The department commander further directs that Captain Martin be instructed to keep each of the two companies in camp under his command isolated one from the other, and that none of the men be allowed to come into the city of Santiago except when imperatively demanded by the requirements of duty until further orders.

Very respectfully,

GEO. ANDREWS,
Assistant Adjutant-General.

On this day (June 22) Companies M and C were disinfected and went into camp on the Morro road, a mile distant from the city and about 2 miles distant from the barracks.

From the date on which these two companies went into camp on the Morro road until the five days' incubative period had passed, June 27, but five cases of yellow fever developed, and from that date on no other case occurred among the disinfected men of these two companies. Much of the credit for the good results obtained in Companies M and C is due to the painstaking and watchfulness of Acting Asst. Surg. E. F. Geddings.

The situation was wholly different in regard to Companies A, G, and the band. They were in camp on the grounds adjoining the barracks. After the faulty movement already described attempts had been made at disinfection; but the conditions were such that, on June 30, the following order was issued:

SPECIAL ORDERS, No. 147. HEADQUARTERS DEPARTMENT OF SANTIAGO, *Santiago, Cuba, June 30, 1899.*

1. Headquarters, field, staff, band, and Companies A (mounted) and G, Fifth U. S. Infantry, now at Santiago Barracks, will be properly disinfected and proceed to Boniato, Cuba, and go into camp there.

Acting Asst. Surg. Frederick Hadra, U. S. A., post noncommissioned staff officers, and members of the Hospital Corps on duty at Santiago Barracks will accompany the command.

The departure of the command and the disinfection of persons, baggage, personal clothing, etc., will be conducted with the greatest care according to a plan prescribed by the chief surgeon; and the commanding officer of the troops will confer with him in order that every detail may be worked out, understood, and complied with.

On the departure of the troops Capt. Hunter Liggett, commanding mounted Company D, Fifth U. S. Infantry, will take charge of the barracks and storehouses and furnish the necessary guard.

The Quartermaster's Department will furnish wagon and railroad transportation, and the requisite subsistence and medical stores will be furnished the command.

The travel enjoined is necessary for the public service.

By order of Colonel Comba:

GEO. ANDREWS,
Assistant Adjutant-General.

During the interim from June 21 until the order of June 30 was finally carried out, on July 2, thirty-one cases of yellow fever occurred in Companies A, G, and the band, and within forty-eight hours after their removal to Boniato eleven more cases had developed.

By referring to the tabulated statement a comparison of the number of cases occurring in the different companies can be made. This statement shows as follows: Companies F, H, I, and K, 1 case each; Company E, 2 cases; the band, 4 cases; Companies B and D, 5 cases each; Company C, 11 cases; Company M, 15 cases; Company G, 23 cases; Company A, 43 cases; noncommissioned staff, 8 cases.

There can be no reasonable doubt that the large number of cases of yellow fever that occurred in the Fifth U. S. Infantry was due in a great measure to the delayed movement, after it was clearly shown that such a movement was absolutely necessary.

The total number of cases that occurred among the officers and enlisted men after the removal of Companies A, G, and band, to Boniato, was 2 officers and 21 enlisted men. Eleven of these cases developed within from twenty-four to forty-eight hours after the movement of the troops, as above stated.

The United States general hospital.—The first case of yellow fever was taken into the United States general hospital on or about June 12, and, notwithstanding that 12 cases had been taken there by June 20, no case occurred in the hospital that could be directly traced to infection therein, until Private Reitz, of the Hospital Corps, was taken sick on June 20, eight days after the admission of the first case into the hospital; proving beyond doubt that the hospital itself was not the seat of infection, but was infected by the cases that had been brought from the barracks.

Between June 20 and July 3 thirty cases occurred at the hospital. It was then decided that beyond all question the hospital itself was infected, and it was evacuated as speedily as possible. Patients to the number of 86, with attendants and medical officers, making a total of 124, were moved out on the grounds in front of the hospital, but almost in contact with the hospital walls on account of lack of space. All precautions and care in disinfection were taken.

Within the next five days but 12 cases occurred, 4 of these among patients who were moved out on July 3, and 8 among Hospital Corps men, female nurses, and civilian employees who had more or less occasion to go in and out of the hospital between July 3 and 7, the day of the final evacuation. After that date, July 7, no other case occurred among the patients or attendants at the United States general hospital, which hospital was removed to its present site on the hill July 12. First Lieut. and Asst. Surg. Ira A. Shimer, United States Army, the commanding officer of the hospital at the time, he himself being a nonimmune, deserves special mention for the conception, detail, and carrying out of this movement.

On July 12, the following general order was issued:

GENERAL ORDERS, No. 34.

HEADQUARTERS DEPARTMENT OF SANTIAGO,
Santiago, Cuba, July 11, 1899.

1. All officers, soldiers, and Government employees are hereby positively forbidden to enter the city of Santiago or its suburbs for any purpose whatsoever unless especially authorized by the department commander. Any of the above-mentioned persons found in the city will be placed under arrest and sent to an isolation camp, and there held for a sufficient time to determine whether or not they have become infected. This paragraph does not include the employees of the sanitary department of the city of Santiago.

The chief surgeon is hereby directed to at once instruct the medical officer or officers, attendants, and employees on duty at the yellow-fever hospital to remain on the island, and under no circumstances to visit the city of Santiago except by special permission of the department commander and after a thorough disinfection of their persons and clothing by the marine-hospital doctor.

Maj. Lawrence C. Carr, surgeon, U. S. V., Acting Asst. Surgs. F. F. Mendoza and J. E. Nunez, U. S. A., are hereby designated to take charge of yellow-fever patients in and about the city of Santiago. These officers will establish a camp in the suburbs of the city, where they will remain except when on duty. The chief quartermaster will furnish them an ambulance for their official use; also an ambulance for transportation of such cases as they may designate. These ambulances will carry a small yellow flag and will be used for no purpose except the transportation of yellow-fever cases and officers engaged in the treatment of these cases. These medical officers will also wear on their left arm a yellow brassard. They are hereby forbidden to enter any public conveyance, store, restaurant, saloon, house, office, private residence, or, in fact, any building except those to which they are summoned officially, the civil office of the department commander, the houses of the patients, hospitals, and their own residence. All other medical officers of the United States Army are positively forbidden to visit the yellow-fever hospital, unless specially authorized by the department commander, and when they do make such visits they will make them in the ambulance on yellow-fever duty, and will follow their visit by a thorough disinfection of their persons and clothing at the marine-hospital ship.

The camp already established at the end of the depot, near the small wharf, is designated as the detention camp, where patients will be temporarily detained, awaiting ultimate disposition. The mayor of the city is hereby directed to maintain a policeman on duty at this wharf and to instruct him under no circumstances to permit any person or persons to approach this wharf except those wearing the yellow brassard of the yellow-fever service. A yellow flag will be hoisted over this hospital. On the arrival of a patient, as soon as it is determined whether he is to go to the island or the detention camp, arrangements will be made to immediately transport him to his proper destination.

2. The mayor of the city is hereby instructed to close every American liquor saloon and bar in this city and to keep it closed until further orders. He is also directed to order all liquor dealers and liquor sellers, restaurant keepers, etc., to discontinue the sale of intoxicating liquors, fermented and malt liquors to Americans under penalty of forfeiting their licenses for the first offense. He is also instructed to arrest all Americans found under the influence of liquor or loitering about saloons. These men will be turned over to the medical officer in charge of yellow-fever work and treated as if they had been subjected to infection. The mayor will place an immune policeman in charge of all houses in which cases of yellow fever have been discovered, and the medical officer in charge of yellow-fever work will cause all inhabitants of these houses to be thoroughly disinfected and to be detained within the limits of their houses until a sufficient period shall have elapsed to demonstrate that they have not become infected. The medical officer will also cause the houses where cases have occurred to be thoroughly disinfected. Instructions given to the police must be of the most binding and definite character and no person permitted to either enter or leave the house. The Casa Granda and the Luttrell House, as well as all other hotels and lodging houses in which yellow fever has been treated or discovered during the present epidemic are hereby ordered to be closed and to be kept closed

until further orders, and their proprietors and inmates will comply with the rules mentioned above in regard to the disinfection of persons, property, and buildings.

3. The chief quartermaster will direct all pack trains to leave the city at once and establish themselves in camp at a distance not less than 5 miles from the city of San-iago. These camps should be in the foothills of the mountains, and must not be in he vicinity of Boniato or any camp recently occupied by the Fifth Infantry, or upon any stream supplying the city of Santiago, El Caney, or El Cobre with water. All eamsters except those absolutely necessary for carrying on Government work are also ncluded in this order.

4. The headquarters, band and four companies of the Fifth U. S. Infantry, now encamped at Boniato and on the hills south of the city, will be moved to Songo at the earliest possible moment. Military headquarters, department of Santiago, including all clerks, messengers, etc., will be moved to-day to Cristo. The quartermaster's department will furnish the necessary transportation. The travel enjoined is necessary for the public service.

5. All railroad companies are hereby forbidden to bring American citizens or soldiers into the city of Santiago or its suburbs, unless such person or persons are especially authorized to enter the city by the department commander.

6. The captain of the port will not permit any ship to touch at the wharves of Santiago, or passengers to land, unless especially authorized by the department commander.

7. The military hospital and barracks situated in the city of Santiago will be placed under guard of the municipal police, and no person or persons permitted to enter them except those connected with the yellow-fever service and those especially authorized by the department commander.

8. The commanding officer at Morro Castle is hereby directed to discontinue all communications with the city of Santiago except as follows:

A boat will touch at the wharf as at present and will receive any orders or requests for supplies, etc. Supplies will be delivered to the chief quartermaster who will send them out by wagon to a point about 1½ miles from the Trocha road. They will be met by a team from Morro which will take them to the post. All water for the use of the troops at Morro will hereafter be taken from the line supplying the Juragua Iron Company's pier. This line will be tapped at a point where the road to Morro crosses the railroad. The trips for water will be made in the early morning and late in the afternoon. No person or persons from the city of Santiago or other points will be permitted to land in the vicinity of or to visit Morro. All mail will be disinfected by the Marine-Hospital Service and delivered by the morning boat. The restrictions governing Morro apply also to Socapo, Punto Gorda and the Island Magazine.

9. No passengers will be allowed to leave this port except under quarantine regulations to be hereafter established.

10. It is enjoined upon all officers, enlisted men, and citizens to carry out faithfully the above order. The present epidemic finds its victims entirely among Americans and other unacclimated residents of the city, and it can only be suppressed and stamped out by the careful observance of the above-mentioned precautions.

By command of Brigadier-General Wood:

GEO. ANDREWS,
Assistant Adjutant-General.

From that date, July 12, to date of report 74 cases of yellow fever occurred (3 officers, 12 enlisted men, 59 civilians), giving a total of 232 cases (12 officers, 129 enlisted men, 91 civilians), with 53 deaths (5 officers, 26 enlisted men, and 22 civilians), a mortality of 22.8 per cent from June 15 to the date of this report.

Yellow-fever hospital.—Cayo Duan is in reality a point of land across the bay, which is virtually an island when the tide rises, separating it from the mainland. It is about 2 miles from the harbor front, and, with one exception, there is no residence within 2 miles of it. This exception is a house which is sometimes occupied by the French consul, and is about half a mile from the island. On this island the yellow-fever hospital is situated. It consists of two buildings—one used for office purposes and the other, a building 147 feet long by 20 feet wide, divided into three wards, roomy, airy, and in a good state of preservation.

The Cayo is about 809 feet long by 396 feet wide, and sufficiently roomy for the purpose for which it was intended. In addition to the two buildings, hospital tents were put up as required. Provisions, medical stores, and necessaries of all kinds were taken to the island in a steam launch used exclusively by the hospital. No communication of any kind was allowed between the hospital and the city except under the strictest sanitary precautions, as provided for in General Orders, No. 34, of this department.

I made many visits to the yellow-fever hospital during the epidemic, especially at the time when work was hard, with from 60 to 80 patients and not a sufficient number of nurses and physicians. This insufficiency was due to the suddenness with which the epidemic came upon us, and was relieved within the next day or two. The island was well policed, buildings and tents kept in good sanitary condition, and the patients lacked nothing. Results will show that their treatment and care were of the best. Acting Asst. Surg. G. A. McHenry, in charge of this hospital, deserves special mention for his tireless and conscientious work. Much credit is also due to Acting Asst. Surg. Bat Smith, who was there on continuous duty from the breaking out of the epidemic until September 19, when he was transferred to the general hospital. Acting Asst. Surg. Edward Nunez also deserves mention for the good work he did at this time. He was on duty twenty-two days at the yellow-fever hospital.

There were treated from June 15 to September 30 167 cases, with 41 deaths. From July 1 to 24 there was an average of 62 patients daily. The first detachment of convalescents, consisting of 23 men, was removed on July 14; the second detachment, of 18 men, on July 20. As an extra precaution the convalescents were cared for, as is shown in the remarks on the detention ship *Delaware*.

The observation station.—This station was established at a small dock which was used as a landing place for the yellow-fever launch. It was not a desirable spot, but it was the only available location. The quarters were somewhat cramped; nevertheless it was always kept clean and rendered as comfortable as possible. It consisted of three hospital tents and one common tent, all well floored. Suspected as well as authenticated cases were sent there. The authenticated cases were placed in a tent and from there removed as speedily as the launch could convey them to the yellow-fever hospital. Every night and morning the floor of this tent was washed with a bichloride solution, the inside well wetted with the same solution, and the tent walls thrown up to allow the tent to dry thoroughly. No furniture or bedding was allowed in this tent. When the patient was removed the mattress or cot on which he came went with him.

The second tent was the receiving tent for suspicious cases. In this tent from three to six cots were kept. When a suspicious case was sent to this station it was received here, and, if the diagnosis of yellow fever was confirmed, the patient with his cot was immediately removed into the tent first described. In cases where the diagnosis was difficult the patients were held in this tent twenty-four, thirty-six, and sometimes forty-eight hours. Then, if there still remained more than reasonable doubt, these patients were transferred to the detention camp on the hill behind the officers' hospital. This tent also was cleaned night and morning in the same manner as the tent first described.

The third tent was for the use of the attendants who did the work at this station. It was cleaned as thoroughly as the others, and rendered as safe from a sanitary point of view, but it could not be kept as inviting.

The fourth, or common, tent was used by the Hospital Corps man in charge of the station. In it were kept the records, telephone, and small supply of needful drugs, food, and other articles necessary for the running of this station. The whole was under guard of the municipal police, who allowed no one to approach other than those having business there.

The detention camp.—This camp was pitched on a high knoll in the rear of the officers' hospital, about a mile from the center of the city, and at least 500 yards from any habitation. In this camp we had some 15 tents, both hospital and common, in charge of a private of the Hospital Corps, with two laborers and two colored female nurses. The surgeons, Mendoza, Veranes, Edward Nuñez, and Julio Nuñez, who were on duty with yellow-fever work, had their tents pitched here. There were also three other tents pitched at a distance of 150 yards from the main camp. These latter were the isolation tents.

To this camp were sent nonimmune persons taken from infected houses. If cases of sickness developed among them, they were taken to the isolation tents and there held until the nature of the illness was determined. At the end of five days, if the illness proved other than yellow fever and they still required attention, they were transferred to the general hospital, the civil hospital, or to their homes. Cases taken from the observation station were also sent to this camp and treated in the same manner.

During the continuance of the detention camp only one case was sent from it to the yellow-fever hospital. This case had been sent to us late in the evening from the civil hospital. The patient was kept in the detention camp over night; the diagnosis of yellow fever was confirmed and he was sent to the observation station next day for transportation to the yellow-fever island.

No case of yellow fever developed among the attendants or any of the patients sent to the detention camp, although all the patients and many of the attendants were nonimmune. This statement holds good also as applied to the workers at the observation station and yellow-fever headquarters. Although nearly all connected with this service were nonimmune, not one case of yellow fever was contracted, and further, although they were compelled to come in contact more or less with nonimmune residents in the city, no case of yellow fever could be traced to such contact.

Yellow-fever headquarters.—The headquarters of yellow-fever work was established at the officers' hospital. Here was kept one infected and two noninfected ambulances and one escort wagon. A small camp was pitched near the gate opening on the Trocha road, and stables were erected for the care of the animals. The office was situated in the hospital building proper, and was in direct telephonic communication with all other points, hospitals, public buildings, stations, etc. Lieut. Victor Shepherd, U. S. V., in charge of the signal corps, made every effort to afford us a prompt and efficient service, and succeeded admirably.

To the gentlemen associated with me at these headquarters I desire to express thanks for their intelligent assistance. Acting Asst. Surgs. Julio Nuñez and F. F. Mendoza grew more and more valuable as time went on and they became acquainted with the American method of handling contagious and infectious diseases. Their knowledge of the Spanish language was of especial value. They were competent, willing, and efficient workers, and carried out orders to the letter. Acting Assistant Surgeon Feuss attended to many important matters, especially the disinfection of the larger houses, the management of the formaldehyde machines, and the scientific and intelligent application of the bichloride solution where it was needed. Acting Asst. Surg. John Carling, after he had recovered sufficiently from his attack of yellow fever, reported to me at these headquarters. He, with Acting Asst. Surg. Edward Nunez, who reported after his return from the yellow-fever hospital, was invaluable in making conclusive diagnosis in all doubtful cases.

The detention ship Delaware.—The *Delaware* was a dredging vessel outof commission, at anchor in the harbor. With the consent and permission of General Wood, it was eased from the dredging company at a rental of $50 a day, and held for a period of thirty-one days. It was thoroughly cleansed, disinfected, and equipped as a detention ship, and anchored about a mile and a half from the dock. On this ship the detachment of convalescents from the yellow-fever hospital, after being thoroughly disinfected, was placed and kept for eight days. This step was taken as an extra precaution, owing to the fact that these men were unfit for duty, and there was no other place where they could be sent and cared for, because the command was broken up in several detachments and moving from point to point in compliance with General Orders, No. 34. At the end of eight days the majority of them were n such condition that they could do light duty, and they were ordered to report to Capt. Stephen Hackney, who was then forming an immune guard for the city, in conformity with the orders of the commanding general of the department. The mmune guard was increased from time to time by the addition of convalescing soldiers, then being returned with some rapidity from the yellow-fever hospital.

On August 13 the *Delaware* was returned to her owners, as the epidemic was under such control that the few remaining cases could be handled with safety.

Disinfection of houses.—When a case occurred in any of the houses in and around the city, it was immediately removed to the observation station. The inhabitants of such houses, immune and nonimmune, were taken therefrom and thoroughly disnfected. The house was closed, disinfected as thoroughly as the formation of the house and our means of disinfecting would permit, and kept closed for seven days under guard of the sanitary police. At the end of this period the immunes were allowed to return, but the nonimmunes were prohibited from entering the house under any circumstances.

The question of disinfecting houses in the city was a difficult problem, owing to their construction. Where they could be rendered even partially air-tight, sulphur fumes or formaldehyde gas was used; where such procedure was not possible, they were completely washed down with a bichloride solution of 1–800. The furniture and bedding in these houses received special attention, and no one was allowed to remove articles of this description from these houses until on or about September 4. It was stipulated and agreed with the officer in charge of the Marine-Hospital Service that the owners would take this furniture to the disinfecting plant of the Marine Hospital Service and have it thoroughly disinfected as an added precaution prior to the moving of the same into a presumably noninfected house. In this work the officer in charge of the Marine-Hospital Service at this station lent his assistance until September 17, when without any explanation he refused to continue the work, and we were compelled to remove furniture from the dock by the side of the disinfecting plant of the Marine-Hospital Service, where it had been lying for forty-eight hours awaiting disinfection. From this date the formaldehyde chamber built for army use and the steam chamber at the old military hospital were used in disinfecting the belongings of the civilians in addition to the work already on hand.

Observations on medical officers and their agreement.—On July 14, two days after the issuing of General Orders, No. 34, a meeting was held at the office of the chief surgeon, at which were present the chief surgeon of the department, the medical inspector of the department, Acting Asst. Surgs. J. H. Feuss, E. E. Mendoza, Julio Nuñez, and Felipe Veranes, U. S. A., Drs. J. D. Castillo, Jose Bisbe, and Urbano Guimera; also several of the merchant residents of Santiago.

The situation was thoroughly canvassed, the different forms of procedure discussed, and the form of procedure then in force was concurred in by all present. One provision of the agreement was to the effect that the Cuban physicians would notify the Medical Department of the Army of any suspicious case of fever, and endeavor to prevent Cuban residents from hiding such cases, thus assisting in the prevention of the spread and continuance of the epidemic. To this all but one strictly adhered, and this department is under special obligation to Doctors Castillo and Bisbe for their energetic assistance, and for the promptitude with which they reported every suspicious case which came under their observation. In this connection Doctor Grillo, who to my certain knowledge reported but one case, and that on the eve of its discovery, when the patient was in the fifth day of his illness, this patient having been taken sick in a house where Doctor Guimera had been attending a succession of patients for more than six weeks, and there is but little room for doubt but that every one of these patients had had yellow fever. With this exception there has, in my opinion, been no attempt to hide cases of yellow fever, unless I include an American physician, utterly irresponsible and mentally unbalanced, who, through ignorance, perhaps, failed to report two cases, both of which were fatal.

Disinfection of the barracks.—On September 4 it became necessary to remove the equipment of the troops from the barracks in order to prepare for the departure of the depot battalion for the United States. This work was placed under the supervision of Acting Assistant Surgeons Feuss, Nuñez, and Carling, assisted by Captain Hackney, Fifth U. S. Infantry.

A formaldehyde chamber had been built between the hospital and the barracks for the purpose of disinfection. The equipment was removed, company by company, in a wagon designated the infected wagon, placed in the chamber, and allowed to remain in the formaldehyde gas under pressure for eight hours. It was then removed by another wagon called the noninfected wagon and turned over to Captain Hackney.

Bimonthly rate of mortality.

	Cases.	Deaths.	Per cent deaths to cases.
June 15 to June 30	66	25	38
July 1 to July 15	108	17	15.7
July 16 to July 31	22	4	18
August 1 to August 15	9	4	44.4
August 16 to August 31	10	0	0
September 1 to September 15	10	2	20
September 16 to September 30	3	1	33.33
October 1 to October 15	4	0	0

From August 1 the number of cases is too small to give value to the percentage of deaths.

Points of infection.

Place.	Cases.	Remarks.
Army and Navy Saloon	1	
Fifth Commissary Barracks	2	First case June 16; last case July 11.
Santiago Barracks	21	
Camp at barracks	31	
Quarters in San Basilio street and arsenal	12	
Colonial Hotel	3	First case June 17; last case Aug. 20.
General hospital	42	
Camp on Morro road	5	
No. 14 Merino street	1	
El Caney	2	
Saluting station	3	
Quartermaster's corral	7	First case June 21 last case July 21.

Points of infection—Continued.

Place.	Cases.	Remarks.
Quartermaster's corral, Cuevitas	2	First case July 30; last case Aug. 3.
Casa Grande	1	
Chief surgeon's office	1	
General Wood's residence	1	
Luttrell House	2	First case July 3; last case July 6.
Boniato	23	First case July 3; last case July 15.
No. 5 San Augustin street	1	
No. 1 San Basilio	1	
American Hotel	1	
27 Enramada street	1	
S. S. Delaware	1	
No. 3 Herdia street	1	
No. 3 San Fermin street	2	First case July 13; last case Aug. 2.
Cristo	11	First case July 13; last case Sept. 19.
No. 2 San Pedro street, baja	3	First case July 14; last case Aug. 12.
Barber asphalt camp	4	First case July 15; last case July 25.
Ice factory	2	
No. 5 San Miguel street	1	
Santiago city jail	2	First case July 17; last case July 29.
Quartermaster's depot	1	
No. 15 San Felix street	3	First case July 23; last case Sept. 10.
No. 1 Caneda street	1	
Dos Bocas	1	
El Transito Hotel	3	
No. 9 Paraiso street	1	
Metropolitan Club	1	
Havana	3	
Camp at Jaragua mines	2	First case Aug. 17; last case Sept. 5.
Palma Soriano	4	First case Aug. 24; last case Sept. 3.
No. 12 Herdia street	2	
No. 8 San Tadeo	1	
No. 23 San Geronimo	1	
No. 2 Herdia, alto	1	
No. 27 San Fermin	1	
No. 34 Rastro street	1	
No. 3 Merino street, alto	1	
Signal Corps offices	1	
No. 55 San Pedro street	1	
No. 5 Jaguey street	1	
Quartermaster blacksmith's shop, Enramada street.	1	
No. — San Pedro street	1	

In addition to the above there are five cases the direct point of infection of which have been unable to locate, they having been sent to us from the civil hospital and places where they had been loafing, not having any definite residence.

At the onset the type of the disease was very malignant. Of the first 12 cases, 8 died. The bimonthly table will show that the disease became more and more benign as the epidemic continued.

Immunity of Cubans.—Eight cases occurred among the Cubans, with no death. One of these was a child 7 years of age, who was born in New York City; another was a boy about 14 years old, who was born in the mountains beyond Guantanamo. The remaining 6 were born in Santiago and its vicinity, and have lived here all their lives.

Immunity of Jamaicans.—There were at least 300 Jamaicans in Santiago at the outbreak of the epidemic, and only 2 of these took sick. Both cases were extremely mild, and both recovered.

Nonimmunity of Spaniards.—There were few Spaniards in the city at the time of he outbreak, and most of them had lived here for years. Nonimmune Spaniards who came here during the epidemic were as a rule stricken down within five or six days after arrival. We had 4 cases among the Spaniards—3 males and 1 female. The males were attacked with the disease in a malignant form, and 2 of the 3 died. The female had a severe attack, but recovered. The other Spaniard was a miner, near Daiquiri, who had lived in this country several years. His case was reported as a mild one. I know of no nonimmune Spaniard that came to this city during the pidemic who escaped an attack of yellow fever.

Susceptibility of American females to contagion.—Early in the epidemic nearly all the American women who were here left, with the exception of the wife and children of the commanding officer and the wife of the executive officer of the general hospital. The commanding officer took sick with yellow fever on June 30. On the next day the ladies left the hospital and two days later sailed for New York. The wife of the commanding officer, however, remained behind and was with him until his death. She left for New York about the middle of July. Of these 4 ladies 1 was taken sick with yellow fever on the transport on its way to the United States.

There remained at this time 9 white female nurses in the general hospital, and in the city and surroundings 11 white women of American birth. Of the nurses 1 was immune. Of the remaining 8, 7 contracted the fever, with no death.

Of the 11 in the city, 3 were immune; and of the other 8, 7 contracted the fever, 3 of whom died. This gives a total of 20 white American women, 4 of whom were immune, leaving 16 nonimmune; of the latter, 14 contracted yellow fever, with 3 deaths.

Recovery after black vomit.—Thirty cases of black vomit recovered. The majority of these occurred at the yellow-fever hospital. Fully 75 per cent of the fatal cases had black vomit.

The sudden checking and ultimate control of this epidemic in the very height of the dangerous season demonstrates that yellow fever can be handled successfully, even in the face of such obstacles as had to be contended with here. Every action taken to this end in conformity with the lines indicated in General Orders, No. 34, met with the instant approval of the commanding general of the department. At the breaking out of the epidemic there were here, independent of the troops, who were nearly all nonimmune, some 700 nonimmune persons, divided about as follows: 300 Jamaicans and 400 Americans, the latter nearly all from northern climes, and with little or no experience of a climate like this, and but little knowledge as to the manner in which they should care for themselves. Nor did we succeed in getting rid of more than 25 per cent of this nonimmune element before the epidemic was over.

These nonimmunes were engaged as follows:

	Americans.	Jamaicans.
Clerks and messengers at army headquarters, civil pay department, sanitary department, and custom-house ... about..	40	0
Quartermaster's clerks, drivers, laborers, etc ... do...	80	50
Barber Asphalt Company ... do...	50	25
Private enterprises, speculators, etc ... do...	80	25
Loafers ... do...	150	200
	400	300

Recommendations.—1. That a health officer be appointed for the city of Santiago, and that he be held accountable for the condition of the health of the city within reasonable limitations.

2. That a regulation, either civil or military, be enacted compelling physicians in this city to report to the proper authority all suspicious cases of fever within twelve hours, imposing a penalty on any physician who holds a suspicious case for a longer time on the plea of making a diagnosis. This regulation should cover all contagious and infectious diseases.

3. That the work of following the few sporadic cases of yellow fever we may have here during the next six months be continued. Disinfecting a house and isolating a patient can be done in sporadic cases with little danger of spreading the contagion and at small inconvenience to the persons occupying the house.

4. That beginning April 1, 1900, all hotel proprietors, keepers of restaurants and lodging houses, private boarding houses, and all places wherein transients may be lodged and fed, report to the proper authority daily the names of all arrivals and departures from their places and the condition of the health of each, as sick or well.

5. That, beginning May 1, 1900, as an added safeguard, the houses as per table in this report be again disinfected. Such disinfection can be made methodically and with slight interference with the business of the owner, and will without doubt constitute a prominent factor in preventing the outbreak of another epidemic.

6. Inasmuch as the nonimmune tramp element is a source of grave danger during the summer months, that on or about May 15, 1900, all of such who may be in this city be deported.

7. That a disinfecting plant of sufficient capacity be provided for civil purposes, and, if possible, one that is portable. This would greatly decrease the cost, time, and inconvenience of house disinfection.

Very respectfully,

L. C. Carr,
Major and Surgeon, U. S. V., Medical Inspector.

A report by Maj. S. T. Armstrong, chief surgeon, United States Volunteers, Puerto Principe, August 25, 1899, states that from an inspection of the city records he learned that yellow fever had occasioned 26 deaths in Puerto Principe in 1894, 696 in 1895, 59 in 1896, 3 in 1897, and 2 in 1898. This mortality was mostly confined to natives of Spain.

On December 6, 1898, the death of a Spaniard from yellow fever was reported, but as no troops were then in the city no apprehension was felt concerning it. Nevertheless, instructions were issued to surgeons in the department to observe all fever cases carefully, to make urinary examinations in each case, and to isolate any patient who had suspicious symptoms. No further suggestion of yellow fever occurred until May 28, 1899, when a soldier belonging to the provost guard was taken on that day and died on June 4. Altogether, including the December case, there were reported to July 31, 1899, 35 cases, 16 of which were fatal; in December, 1898, 1 case; in May, 1899, 1 case; in June, 9, and in July, 24 cases. Twenty-two of these cases occurred in the persons of soldiers. Five came from the barracks occupied by the provost guard, although this building had been carefully disinfected and renovated. Six came from the barracks of the Fifteenth Infantry and only 1 from the quarters of the Eighth Cavalry. Two were hospital patients, 2 hospital corps men, and the others soldiers on duty in the city. The civilian cases occurred in various parts of the city. Altogether there were 16 places in the city from which the 35 cases were derived. It is argued that the disinfection and renovation of the barracks and hospital building (see p. 172) must be regarded as having been efficient, because so few cases occurred among so many men who were nonimmunes. The cases which did occur were regarded as having originated in an exposure to virulent foci in some part of the infected city.

Later in the season, at Cabana Fortress, Havana, an outbreak, which, like that at Santiago, had already made some progress, was suppressed by moving the command from the infected locality. Twenty-three cases, eight of which were fatal, occurred in the battalion of the Second Artillery, which constituted the garrison. The first case appeared August 10, 1899, and the second on the following day in men belonging to different batteries. On the removal of these men to hospital their clothing was disinfected and the barracks, quarters, and storerooms were treated with formaldehyde and mercuric chloride. Nine days passed before the appearance of the third and fourth cases, both of which were taken on the sick report on August 20. Three more, each from a different battery, entered the hospital during the next five days. On August 28, with a view to check the spread of the infection, the command was moved to a camp about three-quarters of a mile distant from Cabana. Several days were occupied in disinfecting and removing the clothing and property, during which fatigue parties from the batteries entered the fort from time to time until September 3, when the gates were closed. Nine men became sick with yellow fever during this period, and seven more became affected in the new camp subsequent to the closure of the gates, the seventh reporting sick five days after all communication with the fort had ceased, or on September 8.

On account of the slow and insidious progress of the epidemic the infection was at first considered as having been introduced from without. Afterwards, when it was found that none of the men attacked had been absent from the post during the ten days immediately preceding their sickness, and that none of the civilian employees who had quarters outside the fort became affected, the post itself came to be regarded as the source of infection. The success which attended the removal of the command to a camp only a short distance away proved the accuracy of this view. Acting Asst. Surgs. P. S. Rossiter and M. A. W. Shockley were on duty with the affected troops. The former, in his report of the epidemic, describes some of the precautions taken:

> Before moving into camp all the personal effects of officers and men, with the exception of the clothing actually worn by them, all bedding, quartermaster property, and clothing were exposed in sealed casemates for four hours to the action of formaldehyde; then hauled into camp.
>
> The men, before opening their lockers, stripped in the company streets and made their remaining clothing into bundles, which were hauled into the fort and disinfected in the same manner. They then entered their tents and put on their previously disinfected clothing from their lockers.
>
> All possible precautions were taken to prevent infection of the hospital quarters and attendants.
>
> The bedding of the patients was changed at least every twenty-four hours and immediately immersed in a 1 to 1,000 bichloride solution. All fæces and vomited matters were received in an 8 per cent carbolic solution.
>
> Nurses, after handling a patient, were instructed to wash their hands in a 1 to 1,000 bichloride solution. After each patient was removed the room was disinfected with formaldehyde and bichloride solution. The mattresses, blankets, bedding, etc., used by the patients and the clothing and effects of those who died were burned by order of the chief surgeon and post commander.

In concluding his report he commends the efficient services of his colleague and pays a high testimonial to the conduct of the men of the hospital corps:

> The corps men were nonimmunes, and when I asked for volunteers among them to nurse the yellow-fever cases every one instantly volunteered, and all conducted themselves with an earnest and cheerful devotion to their duties throughout as great a danger as was faced by any of our troops in battle.

Up to the date of the present report, November 10, 1899, cases of yellow fever and deaths resulting from the disease during the current calendar year were reported to this office as follows:

Place.	Reported to—	Army.		Civilians.		Not stated.		Total.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Santiago, Cuba	Sept. 30, 1899	131	27	71	17			202	44
Havana	Oct. 22, 1899	28	5	32	9			60	14
Manzanillo	July 31, 1899	7	3					7	3
Puerto Principe	do	22	11	12	4			34	15
Matanzas	Oct. 5, 1899	2		2	2			4	2
Guanajay						3		3	
Guantanamo	July 10, 1899	1	1					1	1
Sancti Spiritus	Aug. 31, 1899	1				6		7	
Cristo	Sept. 30, 1899	3		4				7	
Camp Boniato	do	5		4				9	
Key West, Fla	Oct. 31, 1899	9	1					9	1
Total		209	48	125	32	9		343	80

Perhaps the greatest obstacle in the way of preventing yellow-fever epidemics is the difficulty oftentimes encountered in determining the existence of the first case. Sometimes malarial fever presents such symptoms as lead to the strongest suspicion of a yellow-fever infection. Even the macroscopic post-mortem appearances will fail to disclose the malarial character of the case, and not until a microscopic examination of the tissues has been made by an expert pathologist can its true nature be determined. (See p. 295.) Similarly, the veritable yellow-fever case will sometimes present such symptoms as may lead the clinician to consider himself dealing with a malarial infection. Post-mortem examination may leave the case in doubt, and a careful expert examination may be needful to reveal its actual character. As valuable time is lost in carrying out these investigations, the only safe rule for military practice is, in the interest of the command, to regard all suspicious cases as cases of undoubted yellow fever.

The following case was reported by Maj. S. T. Armstrong, United States Volunteers, when the disease made its appearance in Puerto Principe during the past summer:

I have the honor to report that on the morning of June 3 I was requested to see a patient in one of the hospital wards who had the following history:

He had been on duty with the provost guard, Company A, Fifteenth Infantry, since that detachment moved into the city, on December 17, 1898. About 10 o'clock on the morning of May 27 he had a slight chill and felt bad during the day. May 28 he was admitted to the department hospital. He had been drinking a little before he was taken sick, but had no previous illness. His bowels were regular; urine burned slightly; severe pains in the head and lumbar region. Urine, sp. gr. 1.022; contained albumin. Blood examined for plasmodium; negative. Diagnosis, typhoid fever. Treatment, guaiacol carbonate, 0.325 every three hours; turpentine stupes; ol. terebinth., m. 10 every 4 hours. Milk diet.

May 29, patient vomited several times; color, green; bowels loose. May 30 and 31, same conditions.

June 1, patient spat up blood-tinged sputum; vomiting less.

June 2, blood-tinged vomit and stool; fæces clay colored.

June 3, night nurse reported that patient vomited coffee-colored substance at 3 a. m. Seemed very restless; no pain whatever; great depression; anxious expression; urine highly colored, small in amount.

The foregoing includes the notes made to the time I saw the man, and I inclose a copy of the temperature chart.

When I saw him I found the condition last noted, with icterus, epigastric tenderness, tongue suggestive of yellow fever, but pulse and temperature not characteristic. He was at once isolated, and later I saw the characteristic vomiting, and there was gingival hemorrhage. He did not seem to be harmed by the transfer to the San Juan Hospital, but became very restless during the night, and there were black vomit and bloody stools.

June 4, gastric distress and vomiting continued, relieved by pieces of ice; patient weaker. Death occurred at 1.45 p. m.

Necropsy two hours after death; rigor mortis; livores general on body, and skin icteric. Right lung subpleural circumscribed hemorrhagic area anterior surface upper lobe. Left lung normal. Heart in systole; serous surfaces yellow; muscles pale, but no coarse evidence of fatty degeneration. Liver brownish yellow; fatty degeneration cells; gall bladder empty. Kidneys enlarged; swollen; apparently granular. Spleen small; malpighian bodies prominent. Stomach distended by a quantity of coffee-colored fluid; areas of submucous hemorrhage. Lower portion jejunum and first portion ileum contained large quantity of dark bloody fluid; mucous membrane stained by blood and its capillaries were congested. Lower portion of ileum normal and containing small masses of fæces. Vessels of mucous membrane of colon congested. Bladder contained about 12 ounces of urine. Specimens of organs placed in alcohol to be forwarded to the Army Medical Museum.

The building occupied by the provost guard was brushed, washed down, and disinfected, and the privy cleaned before the detachment was moved in. It has been inspected weekly since. This detachment has had a smaller number sick than any other command.

The deceased was on guard in building used as quartermaster's office on May 20; on patrol May 22. He was at liberty to be out at night until 10 o'clock. No yellow fever known to exist in city.

Two other fever cases, one with albuminuria, from same squad room have been isolated for observation.

Detachment removed to camp and surgeon sent with them. No communication with other troops allowed.

Building will be disinfected at once; hospital ward sprayed with 1 to 500 mercuric chloride solution, and all patients carefully watched.

The pathological conditions found in this case were reported by Maj. Walter Reed, surgeon, United States Army, as follows:

The liver is in a condition of extreme fatty degeneration, with extensive necrosis of the hepatic cells, the large majority of these appearing either as denucleated masses of necrotic cell protoplasm or as aggregations of small droplets of fat. A normal liver cell can not be found in the section. Where the nuclei are preserved the protoplasm appears cloudy or distinctly granular; stains brightly with eosin, and generally contains a number of small fat drops. The epithelial cells of the bile ducts stain normally and appear not to be affected. If these had undergone the same necrosis as the other epithelial cells it would be extremely difficult to identify the section as one of liver tissue.

The kidney section presents the appearances of an acute toxic or degenerative nephritis in an early stage. The capillaries of the tufts are engorged with blood and their covering layer of epithelium is desquamated. The endothelial cells of the capillaries are well preserved. Most of the capsules contain a granular débris devoid of nuclei, a few red blood cells, and an occasional fat globule. Here and there a glomerulus appears to have undergone a partial atrophy. The most marked lesion is apparent in the epithelium of the convoluted tubules. Under the low power these cells appear swollen, more refractive than usual, and many of their nuclei are wanting. With the high power one's attention is attracted by the numerous fat droplets these cells contain, some quite small and showing a heaped-up arrangement, others larger and arranged in a more or less continuous zone near to and parallel with the basement membrane. In addition the cell protoplasm is, as a rule, cloudy or granular. In the pyramidal portion numerous fat drops are visible in the epithelial cells lining some of the collecting tubules, but the lesion here is not nearly as well marked as in the cortex. A few granular and epithelial casts are found, and the congestion is as well marked in the pyramidal region as in the cortex.

Spleen: The organ is congested, the malpighian bodies not especially prominent. The pulp is relatively increased and contains numerous blood-carrying cells. Many of the cells in the pulp show little or no staining of their nuclei, an appearance that suggests some form of necrosis. The nuclei of the cells in the follicles stain perfectly.

Stomach: The vessels of the mucosa are engorged, and there is some free blood upon the surface. The epithelium in places shows a cloudy swelling.

Small intestine: Appears to be the seat of an acute enteritis, probably hemorrhagic, but owing to the mode of preservation the red blood cells stain poorly. The type of inflammation is severe; the mucosa and submucosa are markedly infiltrated with leucocytes, and the superficial layer of the former is in most places necrosed and desquamated. Some of the crypts contain necrosed epithelial cells and leucocytes. In one place only a few red blood cells could be distinguished upon the surface.

Conclusions.—Excessive fatty degeneration of liver. Acute degenerative nephritis. Spleen, congested, perhaps the seat of an acute inflammation. Acute hemorrhagic gastro-enteritis. The lesions in the liver, kidneys, and gastro-intestinal tract are quite typical of yellow fever.

Under date July 16, 1899, Acting Asst. Surg. Edward F. Nuñez, United States Army, reported from the yellow-fever hospital, Santiago, Cuba, a method of treatment from which he anticipated favorable results on account of his experience while in civil practice in the province of Santa Clara, Cuba. He holds that as the stomach is the organ primarily invaded, a therapeutic agent capable of destroying the pathogenic microorganism or of attenuating the virulence of its toxin would tend to bring the disease to a favorable ending. He says:

I begin the treatment by giving the patient a dose of calomel followed by a saline purgative, generally epsom salt, and immediately after I commence the use of a solution of bitartrate of potassium and fresh lime juice and the salicylate of phenol or salol, the latter preferably in tablets, every two, three, four, or six hours, according to indications. With the cream of tartar the urine is rendered alkaline and the renal function is stimulated by its diuretic properties. The local action of this agent on the stomach is no less important, since it is pleasant and soothing, quenches the intense thirst, relieves the nausea and vomiting, and by its laxative properties insures free movement of the bowels. With salol a twofold action is obtained—first, the antisepsis of the intestinal tract, and, second, the reduction of the temperature by its antithermic properties. The drug is well borne not only by the stomach, but also by the kidneys, and apparently tends to reduce the amount of albumen in the urine. No alcoholic drink nor nourishment is allowed during the first stage of the disease. The epigastralgia and rachialgia are treated exclusively by sinapisms. During the second stage the salol and cream of tartar, accompanied by large quantities of diluent drinks, especially warm water to which a few drops of lime juice have been added, are to be continued until defervescence takes place.

Later in the season, September 2, 1899, he reported:

> In 23 cases where this treatment was begun at the onset of the disease, or within the first twenty-four hours, there has been no death. In a number of cases, in the fourth or fifth day of the disease, where the symptoms were suggestive of profound yellow-fever intoxication, the treatment appeared to be directly instrumental in alleviating the symptoms within twenty-four hours, particularly the gastric irritation, and to some extent reestablishing the impaired renal function.
>
> At the time I was detailed on duty at the yellow-fever hospital, July 10, 1899, there were 36 cases of yellow fever in the active stage of the disease. From that date until July 27, 32 more cases were admitted. In this total of 68 cases there have been 8 deaths. Of these 8, five occurred in the following manner: Civilian, arrived dead; one died six hours after arrival, one died on the morning following his arrival, and two soldiers died thirty-six and forty-eight hours, respectively, after admission. This would practically leave but 3 deaths in 63 cases treated in conformity with this method.

In connection with the prevention and cure of yellow fever, it may to some persons be a matter of interest to learn that since the outbreak of the war with Spain in April of last year to the present writing, September 2, 1899, there have been filed in this office 699 communications in relation to the prevention or cure of those diseases from which, in the popular belief, our troops would suffer, particularly in the West Indies and the Philippine Islands. Many of these, addressed to the President or Secretary of War, were formally referred to the Surgeon-General of the Army for his consideration. The others were addressed directly to this office. All these communications required a courteous acknowledgment, and many of them had to be handled delicately, in some cases lest the acknowledgment might be published by the interested and unscrupulous recipients as an advertisement to aid the sale of their particular panacea, and in other cases to deal gently with the feelings of the notable men who had thrown the weight of their names into a suggestion for favorable consideration.

The communications may readily be divided into three classes: (1) From patriotic individuals, generally old ladies, whose interest in the well-being of the soldiers led them to put on paper their simple and ingenuous suggestions for the benefit of army surgeons in the management of cases of disease, or who were impressed with the value of something they had read in some newspaper or heard years ago from some intelligent physician, now dead, and desired that the Army Medical Department should not fail in its duty in respect of this knowledge through want of effort on their part. (2) From those interested in the sale of patented or proprietary articles, in the hope that something to their advantage might come of the communication. (3) From people who had a sure cure or protective against such and such a disease. Few of these were patriotic enough to make known their remedy unless on the assurance of a satisfactory remuneration.

Of the 699 communications, 201 related to yellow fever. Few of these came from localities in which yellow fever is even an occasional visitor. Many of the writers requested to be placed in charge of a ward to show the value of their mode of treatment. Such requests involved payment of current expenses, with the assurance of a handsome honorarium or an appropriation by Congress afterwards. Four of the letters, apparently from interested parties, urged the purchase and use of Sanarelli's serum.

TYPHOID FEVER.

The total number of cases of typhoid fever reported as having occurred in the Regular Army during the year 1898 was 4,130. In the first quarter, when the troops were under peace conditions, 16; in the second, 131; in the third, 3,089, and in the last, 894. The greatest prevalence was in August, when 1,420 men were taken sick, constituting 25.19 per thousand of strength, the rate rising from 9.27 in July and dropping to 19.58 in September, 8.91 in October, 3.65 in November, and 1.84 in December. It can not be claimed that this fall in the rate of prevalence took place because the disease had already affected all those who were susceptible to its influence, because recruiting continued to add new men to the regiments, and we know, as a matter of fact, that men who escaped attack in August and September became affected with the disease when exposed at a later date to its infection. That the rate fell in September may fairly be attributed to the sanitary measures that were instituted during the previous month, and notably to the removal of a large part of the Army from their camps near Santiago de Cuba to Montauk Point, L. I.

The total number of deaths reported was 454. From January to June, inclusive, only 8 deaths occurred, giving a mean monthly ratio of 0.04 per thousand. In July the ratio rose to 0.59, and reached its maximum, 2.71, in August, falling, but less rapidly than the corresponding admission rate, through 2.53 in September to 0.21 in December.

The admission rate for the year was 88.56 and the death rate 9.74 per thousand men. These rates were largest in the Medical Department, the rate of admission being 193.41 and the death rate 16.32, which may be compared with the Army rates just stated. This excess of prevalence and mortality among medical officers and Hospital Corps men gives expression to the danger from this fever to which they were exposed in discharging their hospital duties, while a low percentage of fatality among them shows the influence which prompt hospital care and treatment had upon their cases. Of the cases that occurred in the Medical Department 8 per cent died; in the infantry 13.4 per cent, and in the Army, as a whole, 11 per cent. The rates in the artillery were lower than in the other arms of the service—admission rate 62.31 and death rate 5.02 per thousand of strength; percentage of fatal cases 8, as in the Medical Department.

The troops serving in the United States had rates somewhat smaller than those of the Army as a whole. In Puerto Rico a total of 464 cases and 44 deaths was recorded in a mean strength of 3,860 men serving in the island during the period July to December, inclusive. This is equivalent to the annual rates of 240.41 for admissions and 22.80 for deaths per thousand of strength. In Cuba the admission rate was only 58.01, but it is probable that many mild cases were treated by regimental officers who failed to render report of their cases for the months of July and August. In the Philippines the admission rate was 68.21 and the death rate 7.58.

According to the records this fever prevailed to a greater extent, but in a less malignant form, among the white troops than among the colored men. The admission rates were, respectively, 93.24 and 27.64 per thousand of strength and the death rates 10 and 6.31. Of every hundred cases 10.7 were fatal among the white and 22.8 among the colored men.

The relatively large number of cases reported among the troops in Puerto Rico was the result of infection brought from Chickamauga Park, Ga., and Camp Alger, Va. Early in August, 1898, Lieut. Col. Nicholas Senn investigated the cause of the great prevalence of the lisease at Ponce, and reported that a study of the history of 250 cases showed the fever to have been imported from the United States. In Cuba the disease prevailed extensively in the camps around Santiago during the period of active hostilities, and here also the infection was undoubtedly brought with the troops from the United States.

Medical observation in our military camps during the past year has added greatly to our knowledge of the means by which the infection of typhoid fever is disseminated. The knowledge thus gained has uggested measures of prevention and suppression which will be more or less successful, according to the energy and thoroughness with which they are carried out. Measures of this kind were tried during he autumn of last year in the large camps of volunteer troops, and, notwithstanding the most discouraging conditions of widespread infection, hey were successful in effecting a prompt and general diminution in he prevalence of the disease. In some instances they succeeded in reeing the commands entirely from the infection. From this expeience I do not hesitate to say that in well-disciplined commands, with medical officers of good sanitary training and commanding officers of nergy and ability, typhoid fever should cease to be the scourge of military camps and be known in them merely by the occurrence f sporadic cases.

During the civil war the infectious nature of typhoid fever was not ecognized. In the general hospitals cases of this fever were treated n the general wards. With a marching command the blankets of the egimental or division hospitals were baled up on the morning of a march and in the evening were distributed indiscriminately to the yphoid-fever patients or other invalids. No thought was given to he water supply as a factor in the propagation of the disease, although very creek which furnished the supply of some part of a large command was probably defiled by the drainage from upstream camps. With our present knowledge of the etiology of typhoid fever there is o difficulty in accounting for the rapid spread and continued prevaence of this disease among the volunteers of that time. A plate facng page 199 of the third part of the medical volume of the Medical nd Surgical History of the War of the Rebellion shows the curve, r, rather, line of prevalence of this fever during the several years of he war. This line rises abruptly at certain points to a marked elevaon. The line of prevalence of the paroxysmal fevers given elsehere in the same volume rises suddenly every year in July and ugust, showing the influence of season in the development of these evers, but no such seasonal influence can be discovered in the upward rojections of the line of the continued fevers. These projections corespond with the addition of new troops to the Army under the sucessive proclamations of the President calling for fresh levies. The ew troops entered into the sphere of army infection, and the prevance of the disease was continued from year to year during the rogress of the war.

The following tabulations show the prevalence of this fever and the esulting mortality, with the ratios per thousand of mean strength, uring the first eight months of the civil war, in conjunction with the corresponding statistics of the Regular Army in 1898, covering the period of the Spanish-American war:

Month.	Admissions.				Deaths.			
	1861.		1898.		1861.		1898.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
May	49	3.03	19	0.49	5	0.31	3	0.08
June	197	2.94	106	2.21	15	.22	2	.04
July	285	4.12	501	9.27	29	.41	32	.59
August	857	7.86	1,420	25.19	110	.98	153	2.71
September	1,733	10.68	1,168	19.58	205	1.24	151	2.53
October	3,438	13.64	540	8.91	382	1.49	65	1.07
November	4,449	15.03	233	3.65	539	1.79	31	.49
December	3,806	11.30	121	1.84	588	1.71	14	.21
Total	14,814	90.58	4,108	73.55	1,873	11.23	451	8.07
Monthly mean	----------	11.32	----------	9.19	----------	1.40	----------	1.01

During the first eight months of the civil war the ratio of cases to strength, 90.58 per thousand, was considerably greater than the ratio of 73.55 reported from the Regular Army during the corresponding period of 1898. This more extensive prevalence during the civil war is not surprising when we consider that to control the disease was impossible in the absence of a knowledge of its infectious cause. Earnest and well-directed efforts were made to improve the sanitary condition of the camps by caring for the sinks, policing the grounds, draining and grading the streets, and building bunks for the men, and these no doubt prevented much sickness and may have had an influence in retarding the spread of the infection, but that they were of little value in eradicating the prevailing fever is evident from the records. During the year ended June 30, 1862, the first year of the war, the average monthly rate of admission for continued fever was 10.3 per thousand of strength, or 12.3 per cent affected during the year. During the second year the rate continued as high as 7.7 per thousand of the strength; during the third year the average monthly rate was 3, and during the fourth year 3.4. Not until the year after the close of the war, the year ended June 30, 1866, did the average monthly rate of admission fall to 2 per thousand.

The outbreak of typhoid fever in the Regular Army in 1898 was more fulminant than in the volunteer camps of the civil war, notwithstanding our better knowledge of the causes of the disease and the better control of sanitary conditions with which the discipline of regular troops should be credited. The epidemic prevalence rose during the fourth month to 25.19 cases per thousand of strength, but in three months after this maximum was reached the rate of admission fell to 3.65, a rate which was not reached during the civil war until October, 1863, twenty-three months after the maximum of prevalence in November, 1861.

Testimony to the same effect is given by the death rate from this fever during the two wars. A sudden and deadly outbreak continued for a long period in the one case, and a more fulminant but by no means so deadly an outbreak, because controlled in a short period, in the other. During the civil war a progressive increase took place in the death rate from typhoid fever up to December 31, 1861, as shown in the above tabulation, but this increase continued beyond that date. In fact, the rate did not attain its maximum, 2.81, until May, 1862, the thirteenth month of the war. During the Spanish-American war the maximum monthly typhoid-fever death rate of our regular troops, 2.71 per thousand of strength, was reached in August, 1898, the fourth month of the war. Three months later, in November, 1898, the death rate had fallen to 0.49, and the next month it fell to 0.21, while during the civil war the death rate did not fall to 0.49 until October, 1863, thirty months after the fever began its ravages in the camps of the volunteers, nor to 0.21 until November, 1865, four years and seven months after its appearance among the newly levied troops.

The fulminance of the outbreak in the Regular Army in 1898, as compared with the slower progress of the epidemic in 1861, can be referred only to the insanitary conditions connected with the rapid aggregation of men, regulars and volunteers, in the large camps of the past year. The mustering in of troops for war service was slow in 1861, as compared with 1898, so that it was not until October that the mean strength of the armies of the civil war assumed proportions equal to that of the army raised for the Spanish-American war. This may be seen from the following table:

Month.	Mean strength.		Month.	Mean strength.	
	1861.	1898.		1861.	1898.
May	16,161	163,592	September	165,126	268,181
June	66,950	208,237	October	256,884	225,375
July	71,125	265,529	November	301,848	179,186
August	112,359	272,618	December	343,184	168,937

As yet it is impossible to give exact statistics concerning the prevalence of typhoid fever among the volunteer troops; but if these were affected by the disease to the same extent and degree of severity as the regular troops, we would find up to December 31, 1898, a total of 13,987 cases and 1,512 deaths. This would give 1,963 as the total number of deaths from typhoid fever in the whole force, regulars and volunteers. It is evident, however, that the volunteers suffered relatively more than the regulars, for the deaths from this fever reported to the Adjutant-General up to December 31, 1898, as having occurred in the Army as a whole amounted to 2,620.

Since the close of the civil war the infectious nature of typhoid fever has been demonstrated, together with the important part taken by an infected water supply in its propagation. The infection present in the alvine discharges of a patient affected with the disease finding its way by drainage or otherwise into the water supply has been proved to be the cause of many disastrous epidemics. Turning this knowledge to practical account, the Medical Department of the Army has for many years past urged the necessity of providing a pure-water supply and satisfactory methods for the disposal of excreta at all military posts. That it has been measurably successful in its efforts is shown by the records. During the decade 1878–1887 the mean annual ratio of admissions per thousand of strength was 7.41 and the ratio of deaths 1.08. During the following decade, 1888–1897, the mean annual ratio of admissions per thousand of strength was 5.42 and the ratio of deaths 0.55. A death ratio of 0.55 per thousand of strength, or 55 deaths per 100,000 of the population, compares favorably with the ratios in many of our large cities, although the Army is composed chiefly of young men whose susceptibility to the infection of the disease is recognized as being greater than that of the older and younger individuals who constitute so large a proportion of the population of cities.

Our mean annual death rate from typhoid fever during the decade ended December 31, 1897, is exceeded by that of the city of Washington, D. C., which for the same ten years was 78.1 per 100,000 of the population; by that of the city of Chicago, 64.4 per 100,000; and by that of Pittsburg, 88 per 100,000. These figures, however, do not show the entire mortality in the cities mentioned as a result of typhoid fever, for without doubt many of the deaths ascribed to "malarial fevers" were in fact due to typhoid infection. Thus in the city of Washington the deaths reported from typhoid and typho-malarial fever (average of ten years) numbered 78.1 per 100,000 of the population, while 25.4 per 100,000 are recorded as due to malarial fever. In Baltimore the mortality as recorded from typhoid fever is 41.5, and from "typho-malarial and other malarial fevers" 18.3 per 100,000. In St. Louis the figures are: Typhoid fever, 35.7; typho-malarial and other malarial fevers, 49 per 100,000. In New Orleans, typhoid fever, 26.1; typho-malarial and other malarial fevers, 107.2 per 100,000.

In view of the danger attending the use of surface waters, I gave special care at an early period of the preparations for the war with Spain to protect the camps of our newly raised troops against the spread of disease in this way (see page 214), and I am of the opinion that my efforts in this direction were of considerable value, not only in securing the purity of general camp supplies, but in preventing the use of dangerous waters in the vicinity of camps. While there is no doubt that many scattered cases of typhoid fever originated in the use of impure water, particularly in the early occupation of camps before the introduction of a general camp supply by the Engineer or the Quartermaster's Department, it is certain that impure water had little to do with the general propagation of fever in our camps. At Jacksonville, Fla., for instance, a deep artesian water was provided. At Camp Alger, Va., the deep wells sunk by the engineers gave a water the purity of which was verified by many examinations in the laboratory of this office. In other camps city water was used with no prevalence in the city, although the camp suffered from typhoid infection, as in the case of the Second Division of the First Army Corps at Camp Poland, Knoxville, Tenn. Indeed the gradual manner in which local epidemics of fever were usually developed and the irregularity of their distribution in our camps exonerate the general water supplies from responsibility for their causation.

Having reached this conclusion, it became a subject of the first importance to determine why this infectious disease prevailed to such an extent in many of our camps during the first five months of the war. The reasons are apparent, and even in the light of our recent experience I am not sure that under similar conditions we could avoid similar results. Sanitarians generally are familiar with the difficulties attending their efforts to restrict the ravages of infectious diseases in towns and cities. They have to contend with the ignorance and reckless indifference of a large proportion of the population, with the ignorance and mistaken parsimony of legislative bodies, and to some extent with the negligence or perfunctory performance of duties assigned to them by agents of the health department, often appointed as a reward for political services rather than on account of their special fitness for the work. Perhaps it was too much to expect that typhoid fever should be excluded from our camps, unprovided with sewers and occupied by new levies of troops, having for the most part inexperienced officers both of the line and in the staff departments.

Hygiene is one of the principal subjects of examination for candidates desiring appointment in the Medical Corps of the Army, and at subsequent examinations for promotion to the grades of captain and major it is given a most prominent place. It is also the most prominent subject in the course of instruction at the Army Medical School, where the student officers spend five hours daily for a period of five months in practical laboratory work relating for the most part to the cause and prevention of infectious diseases. But the comparatively small number of medical officers of the Regular Army available for duty in the large camps occupied by our volunteer troops at the outset of the war proved to be entirely inadequate to control the sanitary situation in these camps.

The medical officers of regiments were appointed by the governors of States, and, as a rule, were competent professionally; but they were called upon to assume new responsibilities for which they had no special training. Unfortunately, hygiene and practical sanitation are subjects which receive little attention in our medical schools or from physicians and surgeons engaged in the practice of medicine. But even in those cases in which the regimental surgeon was fully aware of the importance of camp sanitation and urgent in his sanitary recommendations, he was unable to control the sanitary situation unless the regimental and company officers enforced the necessary measures for protecting the health of the command. And just here is the fundamental difficulty when we are dealing with new levies of troops. The officers and enlisted men of our volunteer regiments were, as a rule, intelligent, patriotic, and brave, but they were not disciplined. Each man was in the habit of judging for himself and of acting in accordance with his individual judgment. Discipline consists essentially in an unquestioning obedience of orders from those having proper authority to give them. Trained officers can not at once establish discipline among untrained troops, and when both officers and enlisted men are without military experience it is evident that with the best material time will be required for the establishment of discipline. And in the absence of discipline it is impracticable to enforce proper sanitary regulations in camp. The Surgeon-General may formulate sanitary regulations, and the general commanding an army corps or division may issue the necessary orders, but in the absence of discipline these orders will not be enforced. A reckless recruit will drink the water which has been condemned as unsafe, and at night will defile the ground in the vicinity of his tent rather than visit the company sink, which, possibly, is in a disgusting and unsanitary condition because of a failure to carry existing orders into effect.

New levies of troops are especially subject to typhoid fever and other infectious camp diseases, not only because of a lack of discipline and consequent difficulty in the enforcement of necessary sanitary regulations, but also because the individual soldiers are very susceptible to infection, owing to their age, the abrupt change in their mode of life, the exposure and fatigue incident to camp life, and last, but not least, their own imprudence as regards eating, drinking, exercise, etc. The trained soldier has not only learned the lesson of obedience to orders, but has learned how to take care of himself in the field. He will carry a canteen of boiled water or tea rather than trust to luck and drink any water at hand when he is thirsty. He has learned to control his appetite within moderate limits, and when issued rations for five days does not suffer from hunger on the fourth and fifth as a result of extravagant consumption or waste on the first and second days of the period for which he has been rationed. He takes advantage of opportunities for bathing and washing his underclothing, and when his blankets or outer clothing are unavoidably wet he hastens to dry them in the sun or by a fire at the earliest opportunity.

The value of experience and special training is recognized in all departments of human activity, and the military calling furnishes no exception to the general rule. This applies to the staff as well as to the line, and the medical staff is no exception. When, therefore, I say that the evils resulting from neglect of camp sanitation during the earlier months of the war were to some extent due to the inexperience of the regimental surgeons, I am not reflecting upon the professional qualifications of these gentlemen, but am simply stating a fact. I desire to say at this point that many of these regimental surgeons showed a decided aptitude for the service and made themselves familiar with their various duties as medical officers within a comparatively short time. As a rule they were assiduous in the care of the sick, and professionally they were fully the equals of the average doctor in the sections of the country in which their regiments were raised. Indeed, in many instances they were men who had attained distinction in their own State, or even a national reputation.

There was no failure on the part of the medical department of the volunteer army to accomplish all that could have reasonably been expected of it, but without doubt an adequate number of thoroughly trained medical officers could have done much at the outset of the war in the way of preventing the introduction and extension of typhoid fever in our camps.

Want of discipline and inexperience on the part of officers and enlisted men, together with the apparent emergency which caused them to be brought together in large camps in great haste and before proper preparation could be made for their reception and the supply of their many wants, were the fundamental, and to a large extent unavoidable, causes of the extension of typhoid fever in our camps. But the first step in the development of an epidemic of an infectious disease is the introduction of the specific germ to which it is due. Typhoid fever is endemic in nearly all parts of the United States, and when a thousand men are brought together from any section there is a fair chance that one or more of them are already infected with this disease. Unless these cases are recognized at the very outset, the camp site is liable to be contaminated with the infection of the fever, which may be disseminated in various ways to the production of a local epidemic.

At first the importance of caring for the condition of the privy pits was not understood in the volunteer regiments. To officers and men alike there seemed to be nothing more involved in the directions for their care than cleanliness, decency, and the suppression of malodorous exhalations. The important fact that in them were accumulations of typhoid infection was not appreciated. These pits were sometimes so foul that their odor pervaded the whole of the camp. The woods and waste grounds in the vicinity were often defiled. In rocky ground the pits were shallow and usually so full that they overflowed during rains and flooded more or less of the surface with infectious matters. These afterwards dried into dust and pervaded the atmosphere of the camp. Infection was brought into the tents of the men by inadvertently soiled shoes. The taint in progress of time reached their hands, their clothes, and their blankets. It was everywhere. It met them in their food, sometimes infected by their own hands, sometimes by other means from the sinks or the foulness of the ground, as by dust raised in the dry summer day or by flies visiting the mess tables in swarms from the neighboring privy pits. As an illustration of one of the possible ways in which a typhoid epidemic may have been developed, it has been reported that a soldier desirous of leaving camp without permission passed the guard hidden in one of the barrels of a water wagon on its way out to renew the water supply. A subsequent inspection of the camp site of the regiment to which this man belonged showed it to be almost an impossibility for his shoes to be free from defilement.

During the months of May, June, and part of July, 1898, regimental medical officers failed to recognize their first cases of the disease. Case after case of typhoid fever was entered on their registers as malarial remittent fever, and it was only when the disease assumed the proportions of an epidemic that its character was understood. This failure to recognize the true nature of their camp fever was an error in diagnosis made on an extensive scale by the volunteer surgeons of the civil war. It has been made also on an equally extensive scale by British surgeons on duty with troops in India, and it is now being made by many of the practitioners of medicine in certain parts of this country.

To aid medical officers in the diagnosis of their doubtful cases, I sent competent bacteriologists to all the large camps, where their work proved to be of the utmost value. Laboratories fully equipped for all necessary chemical and bacteriological study in aid of the clinical work in the wards had already been established in all the general hospitals. The character of the work done in these laboratories is shown in a report (see p. 62) by Acting Asst. Surg. Charles F. Craig, on the staff of the Josiah Simpson General Hospital, near Fort Monroe, Va.

A marked diminution in the prevalence of the fever was produced by moving the troops to new camping grounds, while at the same time special attention was given to the disinfection and disposal of excreta. (See supra, p. 209.) In moving from an infected camp the infection is not wholly left behind. Exposure to sunlight and a thorough airing of the tents, blankets, and clothing of the men on the new ground will tend to dissipate any infection that may be present in them, but even when the utmost care is taken to disinfect the camp baggage cases of the disease will appear in the new camp if the movement is made directly from the one camp to the other. The germs of the disease are carried in the persons of the men who became infected before eaving the old camp. Such cases are likely to occur for two weeks after the infected camp has been abandoned. This period, covering he stage of incubation of the disease in individual cases, should be permitted to elapse before the new camp is occupied. Every suspect should meanwhile be kept under medical supervision and be removed o hospital as soon as the specific character of the disease has been defined. In this way the infection may be shaken off before the new camp is reached. One division of the Second Army Corps left the nfection of Camp Alger behind it while marching through Thoroughfare Gap, Va., to Middletown, Pa. (See supra, p. 43.) The other division passed the period of incubation on new ground, a few miles from the old site, sending each case of fever as it became declared to the general hospital at Fort Myer, Va.

In 1898 Cuba and Puerto Rico were invaded by troops coming directly from infected camps. Cases of fever originating in these camps were developed on shipboard. These on arrival at the port of debarkation were removed from the commands and returned to the United States. But notwithstanding this the infection was introduced into the camps at Santiago and Ponce, for the voyage to the islands did not occupy a sufficient length of time to permit the whole of the incubative cases to become declared.

The long voyage from San Francisco, Cal., to Manila, P. I., had a marked influence in freeing the troops of the Eighth Army Corps from typhoid infection. Every developed case of the disease and all suspects were left behind in the hospital at the Presidio. The sanitary care exercised over the men to prevent danger from the limited air space of their quarters on shipboard secured the early detection of infected men who had embarked during the stage of incubation, and the pure water supply and the prompt removal of all excreta reduced to a minimum the likelihood of the occurrence of new cases. Nevertheless the disease in progress of time became scattered generally among the troops in Manila, either from the imported cases or from local foci. In no instance, however, has the prevalence been so extensive as in the outbreaks which occurred in the camps at Santiago, Cuba, and Ponce, Puerto Rico.

In view of the extensive prevalence of this fever in our armies, a board of sanitary experts was constituted at my request August 18, 1898, for the purpose of visiting the various camps within the limits of the United States and making a searching investigation with reference to the cause of the spread of the disease. The board was directed while pursuing its investigations to call the attention of the proper authorities to any insanitary conditions existing in the camps visited and to make recommendations with a view to their prompt correction. The officers detailed as members of this board were Maj. Walter Reed, surgeon, United States Army; Maj. Victor C. Vaughan, division surgeon, United States Volunteers; and Maj. Edward O. Shakespeare, brigade surgeon, United States Volunteers.

This board carefully inspected all the large camps in the United States, visiting nearly every regiment in each camp to enable its members to become thoroughly familiar with the conditions under which the soldiers were living. They made an equally careful examination of the conditions affecting the welfare of the sick men in the field and general hospitals. They subsequently investigated the medical history of each command, as shown in the official records, to determine the bearing of the facts discovered during their inspections on the character of these records. Their report will no doubt be exhaustive in its discussion of etiological and statistical questions having a relation to the prevention of typhoid fever and other infectious camp diseases in the future. It will be submitted hereafter for separate publication as a most valuable contribution to the practical work of military sanitation.

Since the occupation of Cuba in December, 1898, the existence of typhoid fever has been reported from several of the military stations in that island. In two instances the outbreaks were prolonged and of considerable severity.

One occurred at Camp Columbia, near Quemados, about 6 miles from Havana. This camp was occupied in the latter part of December, 1898, by the volunteer regiments of the Seventh Army Corps. These were all relieved by regular troops and returned to the United

States for muster out by the middle of April, 1899. More than one-half of the cases of typhoid fever which occurred during the occupation of the camp by volunteer troops were reported from two regiments, the Forty-ninth Iowa and the Second South Carolina, the former having had 40 and the latter 26 cases. The infection in the South Carolina regiment was certainly brought from the United States, for the first case occurred only six days after the arrival of the command in Cuba. The source of the infection in the other regiment is not so evident. During the absence of these regiments on a practice march the opportunity was taken to clean thoroughly and disinfect the camp site and its tentage, bedding, cookhouses, etc. These measures were successful in repressing the disease in the Second South Carolina, but in the Iowa regiment new cases continued to occur until the regiment was withdrawn. A squadron of the Seventh Cavalry came to Camp Columbia without typhoid late in April, and the Eighth Infantry, also free from the disease, toward the end of July. Cases of fever were sent to the hospitals from both of these commands within a month after their arrival. The camp site was manifestly infected. The removal of the troops into new barrack buildings, with the exercise of special care over the sanitation of the camp, has now practically suppressed the disease.

The other and more remarkable of these local epidemics prevailed in the Eighth Cavalry and Fifteenth Infantry, encamped near Puerto Principe, in February and March, 1899. The causes which led to an extensive propagation of fever in these regiments were the failure of inexperienced surgeons to recognize the first cases and their consequent failure to recommend and urge the prompt adoption of those measures which experience had shown to be necessary for the protection of the troops. Maj. Walter Reed, surgeon, United States Army, reported as follows concerning this epidemic:

> I have the honor to report that in compliance with Special Orders, No. 91, paragraph 48, Headquarters of the Army, Adjutant-General's Office, Washington, April 19, I proceeded to Havana, Cuba, where I arrived on the evening of April 24, reporting in person to the commanding general, division of Cuba, on April 25. I thence proceeded on April 26, via Nuevitas, to the city of Puerto Principe, Cuba, reporting to the commanding general of that department on April 28, for duty in connection with the sanitary inspection of the camps, barracks, and hospitals in the vicinity of Puerto Principe, and for the purpose of making a special investigation into the causes of the prevalence of typhoid fever among the troops encamped near that city.
>
> Every facility having been placed at my disposal by the commanding general of the department, I was enabled to complete the inspection called for on April 29 and 30.
>
> I beg respectfully to submit the following report embodying the results of my inspection: First, of the camp sites at present occupied by the Fifteenth Infantry and Eighth Cavalry; second, of the barracks now being renovated for the permanent occupancy of the troops; third, of the department hospital, which has been opened for the reception of all cases requiring hospital treatment; reserving for the latter part of this report the investigation made by me as to the origin and spread of typhoid fever among the troops in that department.
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> *1. Camp of the Fifteenth Infantry.*—Headquarters and five companies of this regiment are at present located in camp 4 miles northeast of the city of Puerto Principe. The camp site appears to be well chosen. It is situated on an open plain, somewhat elevated above the Hatibonico River, from which it is distant about 600 yards; is covered with a good turf and capable of excellent natural drainage. The men are quartered in hospital tents which are well floored, each soldier being also provided with a good cot. Blankets and clothing are daily exposed to the sunlight and tent floors frequently raised for purposes of ventilation.
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> The water supply during the first month of the encampment was obtained from the Hatibonico River, a small, rapidly flowing stream. The source was changed about January 15 to a small stream north of the camp. The water is hauled in

water wagons, stored in barrels, which are well protected with covers, and before being used is first boiled and afterwards filtered through Pasteur-Chamberland filters, one of which is supplied to each company. I was assured by the colonel commanding and by the medical officer on duty with this regiment that none but boiled and filtered water had been used for drinking purposes since the arrival of the regiment in Cuba. The general police of the camp was found to be excellent. All garbage is hauled away daily to a dumping ground about 1 mile distant. No pits for garbage have been allowed in the camp. Company latrines are located about 100 yards south of the mess tents. The dry-earth system has been in use since the establishment of the camp. Wooden boxes about 8 feet in length are provided for the reception of excreta, and each soldier is required to cover his stool with dry earth. These boxes are removed daily on sleds by Cuban scavengers, emptied, and well limed before being again used.

At the time of my inspection these latrines were found to be in an offensive condition, much fecal material being exposed through neglect on the part of the men to make use of the dry earth liberally provided for that purpose. As the boxes were open, flies in considerable numbers were feeding upon the exposed excreta.

The regimental hospital, having a capacity of twenty-four beds at the time of my inspection, was found to be well supplied with comfortable beds, bedding, hospital stores, and medicines. There were only 10 patients under treatment, 12 cases having been transferred on the day previous to my visit to the department hospital in the city of Puerto Principe. I found that, in addition to the usual trivial complaints, there were under treatment 3 cases of "unclassified" fever and 2 cases, supposedly convalescent, from malarial remittent fever. Upon carefully inquiring into the history and treatment of the cases given by Acting Asst. Surg. T. H. Lander, in charge, I was led to conclude that the 2 cases of supposed remittent malarial fever were really cases of typhoid fever and that the 3 cases of unclassified fever were in all probability mild types of the same disease.

Desiring to further ascertain the record of the occurrence of fevers in this regiment, I proceeded to examine the hospital records, which were found to be in a very incomplete condition, no diagnosis having been entered in the register of patients since February 17, 1899. Other records were in an equally unsatisfactory state. For this condition of the hospital records Acting Asst. Surg. T. H. Lander and Assistant Surgeon Wolfe are responsible, the former having been in charge of the hospital from December 11, 1898, to February 19, 1899, and again from April 15 to April 30, and the latter from February 19 to April 15, when he was taken sick with typhoid fever.

From an examination of the earlier records, I was able to ascertain that the Fifteenth Infantry, arriving at Puerto Principe on December 11, 1898, had imported at least one case of typhoid fever into its Cuban camp, the case being admitted to sick report December 19 as malarial remittent and dying on January 4 with ulceration of Peyer's patches. I was also able to find out that during January, February, and March three other deaths had occurred from typhoid fever, besides the occurrence of a number of cases of prolonged fever which did not yield to quinine; and further, from the records of the chief surgeon of the department, that five cases of supposed remittent fever, admitted from this regiment since April 15 to the department hospital, had been changed to the diagnosis of typhoid fever. Under these circumstances, and in view of the information given me by the department quartermaster, that the Fifteenth Infantry would be placed in permanent barracks about May 15, I did not hesitate to recommend that the camp of this regiment be abandoned and a new camp selected for occupancy during a period of about ten days prior to its transfer to permanent quarters. It was also recommended that the old latrine boxes be burned and that galvanized-iron vessels with suitable covers, then on hand in the quartermaster's storehouse at Puerto Principe, be substituted for the infected boxes.

2. *Camp of the Eighth Cavalry.*—The present camp site of this regiment is situated 1½ miles south of the camp of the Fifteenth Infantry, between the line of the Nuevitas and Puerto Principe Railroad and the Arroyo Guirre, a branch of the Hatibonico River. It has only been occupied since April 3, on which date the regiment was moved from its old camp site on the Hatibonico River. Without entering here into particulars, I may say that the new camp is admirably located on a perfectly drained site and that its sanitary condition as to quartering and care of the men, facilities for bathing, water supply, general police of the camp, and condition of the latrines was found to be excellent in every respect. The same care had been taken as already mentioned for the Fifteenth Infantry, in the matter of using only boiled and filtered water for drinking purposes. In the old camp wooden boxes were used in the latrines, whereas in the new camp galvanized-iron boxes with tight covers are used for the reception of excreta. These were

n excellent sanitary condition, being liberally supplied with carbolic acid and dry arth. I noted a complete absence of flies about these latrines. I also observed hat in order to avoid the contamination of the soil with urine, tin vessels containng a solution of carbolic acid were provided, one of these being placed in each ompany street at night. All excreta and garbage are removed daily and manure auled away from picket lines twice daily. The picket lines are well removed rom the mess tents and the latrines placed at a considerable distance beyond the icket lines.

Having made a careful inspection of this camp, I am convinced that nothing is eft undone by the commanding officer and the officers of the regiment which ould in any way add to the betterment of its sanitary condition. I shall have ccasion to point out in another part of this report the remarkable reduction in ne occurrence of cases of typhoid fever in the Eighth Cavalry as the result of the emoval of the camp and the enforcement of these rigid sanitary measures.

3. *Barracks.*—Accompanied by the chief surgeon of the department, Maj. S. T. rmstrong, United States Volunteers, and Capt. B. T. Simmons, assistant quar-ermaster, United States Volunteers, department quartermaster, I made a careful nspection of the old Spanish cavalry barracks and the Spanish military hospital, oth of which are now undergoing renovation, the former for the permanent quar-ering of band and eight troops of cavalry, and the latter for the band, five companies f infantry, and four troops of cavalry. I am pleased to report that under the rders of the department commander the two officers above mentioned have worked ogether in perfect accord and that the thoroughness with which all material hich could serve as a possible source of infection has been removed, and the ainstaking and intelligent care with which the disinfection of every square inch f the interior of these buildings, including surface disinfection of the soil beneath ne floors, has been accomplished is deserving of the highest praise. At the time f my inspection the cavalry barracks was almost ready for occupancy, and the oors in the infantry barracks were being rapidly laid. I was told that the work n the latter would be complete about May 15.

The emptying and disinfection of the old cesspools pertaining to these buildings as been thoroughly carried out and their walls carefully recemented so as to revent any possible seepage. Additional provision for the reception of excreta ill be made by the erection of closets, after the pattern recommended by the oard of officers convened by Special Orders, No. 194, paragraph 40, current series, djutant-General's Office, August 18, 1898. These, as well as the cesspools, will e emptied by odorless excavators, two of which are now on hand. The large nderground cisterns belonging to these buildings will be pumped out, carefully eaned, and recemented. In the meanwhile water will be hauled from the Hati-onico River pending the completion of the artesian well, work on which had just egun.

When the renovation of these buildings is completed they will be admirably dapted as to capacity, lighting, coolness, and ventilation for the permanent uarters of troops.

4. *Department hospital.*—On January 30, 1899, the Spanish artillery barrack uilding was assigned as the department hospital. The work of renovating this uilding was at once begun, under Major Armstrong's supervision. The work as suspended from February 25 to March 8 owing to lack of funds. From the tter date the progress of renovation was again pushed as rapidly as possible, ne building being ready for the reception of patients on April 9. I inspected this ospital on April 30. Its capacity is 120 beds, with a personnel consisting of 1 rgeon, 3 acting assistant surgeons, 1 hospital steward, 1 acting steward, 8 ained female nurses, and 13 privates of the hospital corps. Its wards were found be large, well ventilated and lighted, and admirably adapted for the purposes tended. Special rooms were set aside for the treatment of officers and for olation purposes. The number of patients under treatment was 42, none of hom had any complaint to make as to their treatment; on the contrary, those to hom I spoke expressed themselves as entirely satisfied with the attention given em.

The quarters of the medical officers, stewards, nurses, and men of the hospital orps were suitable and in excellent condition. In addition to the regular kitchen ere was a well-equipped diet kitchen in charge of one of the trained nurses. ooms for bathing purposes had been provided for the physicians and members of e hospital corps, these rooms being drained into the hospital cesspool. The lat-er had been emptied, disinfected, and recemented. The hospital storeroom and ispensary were in good condition and well supplied with all necessary supplies. here was found to be on hand the complete equipment of a 300-bed hospital, cluding bedsteads, woven-wire and hair mattresses, pillows, blankets, sheets, osquito bars, etc. The records of the hospital were complete and up to date.

Discipline appeared to be very good. All floors and stairways were clean and the inner courtyard carefully policed. The surgeon in charge, Major Armstrong, chief surgeon, is deserving of the highest commendation for the intelligent renovation and the present admirable condition of this hospital.

5. *Origin and spread of typhoid fever among the troops.*—In investigating this subject I find that the headquarters and six troops of the Eighth Cavalry left Huntsville, Ala., on November 10 and arrived at Nuevitas, Cuba, on November 19, 1898. During the voyage from Savannah to Nuevitas a case of typhoid fever occurred in Troop G, on November 14. By order of Brigadier-General Carpenter this soldier was transferred to the transport *Manitoba* and returned to the United States. I further find that two days before the squadron's departure from Camp Albert G. Forse, Alabama, a case of typhoid fever was admitted to the first district hospital from Troop A, Eighth Cavalry.

Leaving two troops (C and I) at Nuevitas, headquarters and Troops A, B, G, and M proceeded, on November 24, to Puerto Principe, where they arrived on November 28 and went into camp 4 miles northeast of that city and about 300 yards to the south of the Hatibonico River. Troops C and I rejoined from detached service at Nuevitas and Minas, Cuba, on January 29, and on February 15, 1899, Troops D, E, F, H, K, and L arrived from Huntsville, Ala., so that on the latter date the entire regiment was encamped at the point above indicated. The site selected was an open plain covered with a good turf and having a slight incline toward the Hatibonico River. The picket lines were placed about equidistant between the mess tents and the company latrines, and not more than 40 yards distant from either of them. Open wooden boxes about 8 feet long and 20 inches wide were provided for the reception of excreta, and dry earth furnished for covering the latter. These boxes were removed and emptied daily by Cuban scavengers. Water obtained from the Hatibonico River above the site of the camp was boiled and filtered.

During the following month, December, no case of typhoid fever is recorded. I find, however, that the report of sick and wounded for that month, signed by Acting Asst. Surg. J. P. Young, shows that 92 cases of remittent malarial fever occurred. While the majority of these cases were of short duration, 14 cases lasted from ten to twenty-one days, notwithstanding the liberal administration of quinine. Cases of fever of even longer duration are recorded for the first week in January. A case admitted from Troop G on January 13 as malarial remittent fever died on February 7, and upon autopsy showed the lesions of typhoid fever. This case points very strongly to the true character of the prolonged cases occurring during December and the early part of January. Troops C and I rejoined the squadron on January 29 from detached service at Nuevitas and Minas. A soldier of C Troop, admitted January 26 with diagnosis of remittent fever, died on February 8 and showed at autopsy the lesions of typhoid fever. This case was therefore imported into its new camp by Troop C. February 15 Troops D, E, F, H, K, and L arrived at Puerto Principe direct from Huntsville, Ala., importing two cases of typhoid fever additional. It does not appear that the occurrence of the two deaths above mentioned from typhoid fever, in a camp where many cases of prolonged fever were occurring, excited any particular alarm on the part of the then acting regimental surgeon, Acting Asst. Surg. J. P. Young, or his successor, Maj. R. Burns, surgeon, United States Volunteers, who assumed charge on February 11.

I extract from the records of the chief surgeon's office the following weekly record of fevers occurring in the Eighth Cavalry:

Date.	Malarial fever.	Typhoid fever.
February 5	63	
February 12	38	4
February 19	38	7
February 26	[1] 72	7
March 5	[2] 60	6
March 12		55

[1] Slight, 45; grave, 27. [2] Slight, 44; grave, 16.

Thirty-four cases of "fever not classified" were admitted during this week.

These records further show that on March 12 64 cases of slight and 20 cases of grave malarial fever were wiped out, 50 cases going to the typhoid list and 34 cases to "fevers not classified."

The foregoing figures show that the statement made by Major Burns, surgeon, United States Volunteers, in his letter addressed to the Surgeon-General United States Army, under date of April 2, 1899—viz, "When I came here (February 11, 1899) I found that quite a large number of men were marked 'malarial fever' who evidently had typhoid fever" was quite misleading. The facts show that it required not less than thirty-one days to enable this medical officer, in the midst of an epidemic of fever, to find out that he had typhoid fever and not malarial fever to deal with. I was informed by the department commander that on March 12, as soon as he had obtained information that typhoid fever was epidemic in the camp of the Eighth Cavalry, he had at once requested the chief surgeon of the department and Major Burns to suggest such sanitary measures as would lead to the prompt control of the disease and that as the result of this request Major Burns had stated his belief that the epidemic was at its height and could be controlled and that the chief surgeon acquiesced in these views.

It was the failure on the part of these medical officers to properly appreciate the situation confronting them which contributed to the largely increased number of cases of fever and hence to the overcrowding of the regimental hospital and to the discomforts to which the sick appear to have been subjected.

At the time of my inspection this hospital had been practically abandoned, the sick having been transferred to the department hospital. I am therefore unable to state from personal observation just what conditions prevailed during the month of March.

I was informed by Acting Asst. Surg. A. H. Zonner that he reported for duty at the regimental hospital of the Eighth Cavalry on February 25; that he was put in charge of a ward with 20 patients and was told that the cases were malarial in character; that on February 27 he diagnosed 15 out of the 20 cases as typhoid fever and so informed Major Burns, the surgeon in charge; that many of the cases were in the second and third week of typhoid fever when he took charge; that during March there was much shortage in supplies, such as sheets, pillowcases, nightgowns, pajamas; that stimulants were short; no pails on hand in the hospital; that when a patient needed sponging it had to be done from a hand basin, of which there were few; that patients who had soiled their persons lay for a week or more naked; that the hospital-corps men were insolent and worthless, and that the 48 men detailed during the latter part of March from the regiment were utterly worthless.

Acting Asst. Surg. C. J. Cruikshank, on duty at the Eighth Cavalry hospital from March 24 to April 22, stated to me that at the time he reported for duty there were about 130 cases in hospital, many of them cases of typhoid fever; that there were 8 beds to a tent; that no attempt was made to separate cases of typhoid fever from other patients; that there were not sufficient wire mattresses, and hence the sick man's cot and blankets were brought with him to the hospital; that the soldier's outfit, including clothing and mess outfit, was put under his cot and all returned to the regiment, after convalescence, without any disinfection; that there were only sheets, pillowcases, and pillows sufficient for half of the sick when he first joined; within ten days a second supply arrived; mosquito nets were plentiful; that the food supply was at all times sufficient, there being an abundance of milk and a special diet kitchen; that flies were a veritable pest, it being impossible to keep them out of the food; that the nursing was as good as could have been expected; that there was one wardmaster and two men at night; that for a very sick patient an extra man was obtained from the regiment; that stools were received in a bedpan containing dry chloride of lime and taken at once to the crematory and burned, the bedpan being dipped in boiling water before being returned; that the buttocks of patients were not disinfected; that flies had frequent access to the stools, and that a number of the hospital-corps detachment contracted the disease.

I found Acting Assistant Surgeon Artaud, on duty at the time of my visit, charged with the closing of this hospital. He had relieved Dr. Burns on April 4. He stated that when he took charge affairs were in a bad shape; that the records were in such a condition that nothing could be made out of them; that no diagnosis had been entered on the register of patients; that there were sufficient supplies of all kinds on hand, such articles as pillow slips, sheets, etc., having only just arrived; that there were 140 patients in the hospital, 99 of whom were cases of typhoid fever, 6 malarial, and 43 undetermined fevers; that there were 27 hospital corps privates, 2 acting stewards, and 3 Spanish Sisters of Mercy, but no trained nurses; that 3 acting assistant surgeons, 1 acting steward, 15 privates of the hospital corps, and 6 trained female nurses arrived within a few days; that the discipline of the hospital corps was at a low ebb when he assumed charge, the men being indolent and trifling; that he had to revoke the detail of the senior acting steward for worthlessness; that privates of the corps were caught stealing milk and whisky intended for patients, wearing pajamas, and using the sheets and pillowcases to which they were not entitled; that the acting assistant surgeons were under no discipline, leaving camp when they pleased without permission; that the disinfection of stools was utterly deficient; that prior to his arrival the soldier's clothing and mess outfit was kept under the sick man's bed, these being returned with him to the regiment without disinfection.

I was able to verify the fact that the records of this hospital were in a hopeless state of incompleteness and confusion. It was impossible to ascertain the number of cases of typhoid fever that had been admitted or to ascertain their distribution amongst the several troops of the regiment. No diagnosis had been entered later than February 11.

With regard to his failure to recommend that the regiment be moved from its infected camp site on March 12, when 50 cases were transferred from malarial to typhoid fever, the chief surgeon stated that he was persuaded by the regimental surgeon that the disease had reached its worst stage and could be controlled without removal. He was, however, I am pleased to report, later convinced of the folly of this opinion by the occurrence of 13 additional cases of typhoid fever for the week ending March 26, with 3 deaths, and 39 new cases for the week ending April 2, with 3 deaths. A recommendation that a new camp be selected for this much-infected regiment was not made until March 26, when the cases of typhoid fever had risen to 63, fevers undetermined 54, and a general sick rate of 280 per 1,000. The regiment having been moved into a new camp on April 3, the following is the weekly record of typhoid fever for the remainder of the month:

Date.	Typhoid.	Malarial.	Not classified.
April 9	5	----------	49
April 16	5	7	----------
April 23	3	5	29
April 30	4	2	1

The total number of cases of typhoid fever that had occurred to date was reported by the regimental medical officers as 103, with 24 deaths. Taking the average mortality of this disease in military camps, I am of the opinion that not less than 250 cases of typhoid fever occurred in the Eighth Cavalry during the epidemic.

To sum up briefly the occurrence of typhoid fever in the Eighth Cavalry, I find that the disease was imported by this regiment into its Cuban camp, but was mistaken by the various medical officers on duty with the regiment for malarial remittent fever until the epidemic had reached serious proportions; that it was clearly not due to water infection, but was transferred from the infected stools of patients to the food by means of flies, the conditions being especially favorable for this manner of dissemination by reason of the close proximity of the picket lines to mess tents and latrines. I also find that the lax methods of disinfection of stools and clothing of patients in hospital were additional sources of infection.

I find here a repetition of the same story of mistaken diagnosis with regard to the character of camp fevers that occurred in every military camp in the United States last summer, and the same absence of any evidence pointing to the contamination of the drinking water.

I further find that even when the character of the epidemic had been ascertained, both the regimental surgeon and the chief surgeon of the department exhibited a most astonishing ignorance of camp sanitation, in that they failed to recommend the one radical measure for the protection of the command, viz, the removal of the regiment from its infected camp site.

In conclusion, I beg to report that at the time of my inspection the epidemic appeared to be well under control in the Eighth Cavalry camp, and I have every reason to believe that the change of camp recommended for the Fifteenth Infantry, followed by its transfer into permanent barracks, will also serve to arrest the disease in the latter regiment.

Little need be said at the present time concerning the details of the treatment of typhoid fever adopted in the various hospitals. Few special reports were drawn up by medical officers, and these came usually from small commands where there were relatively few cases rather than from large hospitals where there were many. In general, however, the treatment consisted of cold baths or cold sponging to reduce excess of temperature, and trained nursing under medical supervision to meet emergencies. A report from the post at Vancouver Barracks, Wash., giving clinical histories and thermographs of eighteen cases among men belonging to the Eighth California Volunteers was forwarded by Acting Asst. Surg. Robert C. Yenney. None of these cases had a fatal ending, although several were of marked severity and prolonged duration. The report concludes with the following statement of the treatment employed.

First. Absolute rest in bed, with enforced use of bedpan and urinal.

Second. Cotton jacket to chest.

Third. Calomel in broken doses on admission to insure thorough emptying of intestinal tract. Diarrhea, if moderate, was left alone; if severe, a pill containing 1 grain each of lead and opium was given, to be repeated not oftener than every two hours if a bowel movement had occurred since the last pill was taken. If the bowels remained unmoved for twenty-four hours, low enemata of soap suds and olive oil were used; this especially during convalescence.

Fourth. Milk, with limewater or beef tea, given every two or three hours, formed the basis of the diet, and was strictly adhered to unless decidedly contraindicated. Beef broth, chicken soup, and oyster soup were freely given during the course of the disease and during convalescence; water and cracked ice ad libitum.

Fifth. Internally, strychnia 1 mgm., with whisky 7 to 15 c. c., every two or three hours. During convalescence, turpentine 0.330 c. c. in emulsion, and often Fowler's solution 0.18 to 0.33 c. c. three times a day.

Sixth. Temperature taken every two hours, and if above 102.5° a cold sponge bath, lasting from fifteen to thirty minutes, to be given; temperature taken again in half an hour and bath repeated if needed.

Seventh. Turpentine stupes to abdomen several times each day.

Eighth. Patient to have back rubbed morning and night with solution of alum and alcohol to prevent bed sores and add to general comfort. Those showing little tendency to change position in bed to be turned over from time to time. This was found to be especially necessary during convalescence.

Ninth. Treatment of complications. These were comparatively few. The tendency to hyperpyrexia, noted in a few cases, was combated by the use of cold sponge baths and ice to the head and spine. Phlebitis, which occurred in three cases, in each case involving the right femoral vein, was treated by slight elevation of the limb, iodine over the course of the vein, and wrapping the entire limb in raw cotton, held in place by a light bandage. Severe hemorrhage from the nose in three cases was controlled by plugging the anterior nares. Slight affections of the respiratory tract in two cases were treated by counterirritation over the chest, with turpentine stupes and ammonium chloride internally.

Tenth. All stools and soiled bedclothing disinfected at once.

The Woodbridge treatment of typhoid fever was employed in August, 1898, at the general hospital at Fort Myer, Va. Dr. John E. Woodbridge, then serving as an acting assistant surgeon, reported for duty at this hospital July 30, and was placed in charge of two wards, with authority to carry out his plan of treatment in the cases under his care. He was informed also that if his results sustained his claims his method of treatment would be adopted in every ward of the hospital, which then contained nearly 400 cases of typhoid fever. According to the statement of Maj. William B. Davis, surgeon United States Army, in command of the hospital—

All cases admitted to this hospital were subjected to Widal's test and only those pronounced typhoid which gave the reaction. One test was not relied upon, if negative, but the test was repeated three or four times at intervals of a week apart.

Dr. Woodbridge had 58 cases in his wards, 37 of which gave the Widal reaction. He lost 4 of these, a mortality of 10.81 per cent, one fatal case having been under his care eight days, one fifteen days, and two seventeen days each. In other words, all the fatal cases had been under his care on an average slightly over fourteen days each, so the plea that they were dying on admission can not be considered. So far as we could observe there was absolutely no "abortive effect" produced by the "Woodbridge method" in the cases treated at this general hospital. It is to be observed that the Woodbridge treatment has its principal adherents at places where the Widal test is not available, as, for instance, in the field. In other words, in those cases where the diagnosis is not confirmed by the only method now recognized as having any claim to precision in differentiating typhoid fever from other diseases which greatly resemble it. The above-mentioned facts speak for themselves and require no comment. Dr. Woodbridge made no converts here, though we were all but too ready to have been convinced had he made his claims good.

Dr. John Auld, of Philadelphia, Pa., submitted to this office in August, 1898, a system of treatment by copper arsenite, nuclein, mercury biniodide, and strychnia. He was authorized to test his treatment in the hospitals of Philadelphia, to which many soldiers suffering from typhoid fever were then being sent. Later, on October 31, 1898, he forwarded thermographs of six cases in which benefit was claimed for the method of treatment under consideration and requested further opportunity to place the subject before medical officers in charge of hospitals. He was told that while I did not feel justified in giving directions to army medical officers having charge of cases of typhoid fever with reference to the treatment to be pursued, I was perfectly willing to have further trial made of his method by any medical officer in charge of cases of this disease. No further communication on this subject has been received.

A special report from Carl H. Andersen, acting assistant surgeon, summarizes the treatment of eighty-seven cases, of which only one was fatal, in the tent pavilions of the general hospital, Fort Monroe, Va., July 20 to November 20, 1898. Twenty-nine of the cases had hemorrhage from the bowels and thirty-three had delirium. Baths were not used. Calomel was given occasionally according to the condition of the patient's bowels; strychnia in every case, increasing the dose above the minimum of one-sixtieth grain when necessary, and morphia only when there was violent delirium. Other than this the treatment was purely dietetic: Two ounces of milk, with 2 drachms of brandy in water when necessary, every two hours. The milk was increased gradually to 6 ounces at each administration, if observation showed that this quantity was completely digested. This diet was continued for two weeks after the temperature became normal, during which time the patient was not permitted to sit up. Light special diet was given for two weeks longer, after which more substantial food was allowed.

In illustrating his method Dr. Andersen introduces the history of a case in which collapse from intestinal hemorrhages was successfully treated by intravenous injection of normal (physiologically) salt solution.

> On the twenty-ninth day the patient had a copious hemorrhage from the bowels. He exhibited great depression and again appeared on the verge of collapse. His skin was cold and clammy. Normal salt solution was administered in the rectum every six hours with very fair results. I then decided on transfusion. The normal salt solution heated to 106° F. was placed in a clean fountain syringe, properly elevated, a glass pipette point attached to the end of the rubber tubing, and the liquid gradually introduced into the median basilic vein. The fountain syringe was elevated 3 feet above the patient and a quart of the salt solution injected. The pulse grew stronger, the body warmer, and the result attained was generally satisfactory. Strychnine nitrate in doses of one-thirtieth grain was administered every two hours. Brandy was given in the usual doses every five hours. Rectal enemas and strychnine were kept up all night and next day. The strychnine was reduced next day.
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> On the thirty-first day the patient began to improve greatly, when another hemorrhage occurred. No pulse could be felt in the wrist. A quart and a half of normal salt solution was then injected into the median basilic vein. The temperature of the solution on this occasion was 105°. The patient's temperature at the completion of the transfusion was 104.2° F. The result was extremely good on this occasion. Hot-water bags were applied; strychnine given in doses of one-thirtieth of a grain, and rectal enemas of normal salt solution continued. On the thirty-fifth day another large hemorrhage occurred. The nurse on this occasion

thought the patient dead. No pulse could be felt in the wrist. The face was cold and clammy. Hot-water bags were at once resorted to; the patient was wrapped in woolen blankets; strychnine was increased, and finally a quart of normal salt solution was transfused. The patient did not rally so well as formerly, and normal salt solution at a temperature of 108° F. was transfused. As the patient complained of pain in the region of the heart after a quantity of the solution had been injected, the fountain syringe was lowered somewhat and the transfusion proceeded with more slowly. The improvement upon this occasion was very marked. Albumen water and milk were administered freely as nourishment. The patient gradually improved, and I hoped that all hemorrhage had ceased. This did not prove correct, however. On the thirty-ninth day he had two very severe hemorrhages, one at 10 a. m. and another at 3 p. m. Transfusion was resorted to after each. One quart of normal salt solution was injected on each occasion. The results attained were fair. Hot-water bags and turpentine stupes were resorted to. Stimulants were kept up, and nourishment forced as much as possible. Brandy and strychnine continued to be the stimulants used. On the forty-fifth day another but smaller hemorrhage occurred. Transfusion was again resorted to. On the forty-seventh day a quart and a half of the solution was transfused. At this time the temperature of the patient was 102.5° F.

From this time on the patient steadily improved. His appetite was good at all times, except twelve to sixteen hours after the transfusion, when he rejected all food. It was then administered by the rectum. On the fiftieth day the patient's temperature was 100° F. in the morning and 103° F. in the evening. The treatment now consisted of: Five ounces of milk every two hours; one-twentieth of a grain of strychnine nitrate every two hours; one one-hundredth of a grain of digitalin every four hours, and the usual amount of brandy every two hours. Albumin water was freely administered. On the fifty-fifth day large abscesses (not bedsores) appeared on cheek, side, leg, and other parts of the body. These were opened, the pus removed, and the parts aseptically dressed. On the sixty-second day a large abscess of the finger occurred and necrosis of the bone was developed. The bone was removed and the wound healed quickly.

Up to this time all temperatures had been taken in the axilla.

On the seventieth day the patient was given milk toast in conjunction with the albumen water and milk, brandy, etc., formerly allowed. The temperature of the patient was now (taken in mouth) 99.5° F. in the evening and 97.5° F. in the morning. From this on the temperature remained normal. The abscesses which had formed all over the body did not recur, and on the seventy-eighth day the patient was able to sit up for the first time. From this time his convalescence was rapid and complete.

Whether the abscesses resulted from the transfusion of the salt solution is an open question. It is to be assumed that the solution was sterile. The report states that before transfusion it was heated to 106° F. It would have been judicious to have had it cooled to this temperature from a recent sterilization by boiling.

Two cases of perforation of the intestine in which surgical aid was called in have been reported.

Perforation in typhoid fever; operation; recovery; reported by Najeeb M. Saleeby, acting assistant surgeon, Camp Columbia, Cuba, May 23, 1899.—Corpl. Nat. Field, Company A, Forty-ninth Iowa Volunteer Infantry, had an attack of typhoid fever during September and October, 1898, while at Camp Cuba Libre, Jacksonville, Fla. The attack was severe and marked by excessive diarrhea and bloody stools for a few days. He resumed his duties December 1, 1898, and was well and strong until his present illness, the onset of which was insidious and marked only by headache and slight feverishness March 24, 1899. He played baseball in the afternoon of the second day and remained in quarters, working part of the time, until March 28, when he had high fever, and was admitted to the regimental hospital March 29. High fever; bowels rather constipated. April 1, temperature high; weak; abdomen slightly tender in the right iliac region; typical eruption present; spleen slightly enlarged. The fastigium was not marked by any note until the night of April 6, the thirteenth day of the disease. At 11.30 p. m. of that day the patient was awakened by an unusual, acute, griping pain at the pit of the stomach, alleviated by turning over on the stomach. The pain recurred at intervals in the night. Next morning the abdomen was unusually tender and painful. Calomel was administered in grain doses every hour for four doses, and was followed by half an ounce of Epsom salt at 3 p. m. The temperature was then 103.6°, pulse 108, respiration 18; an ice and alcohol sponge bath was given. The pain remitted.

but remained all day, and increased markedly after the administration of an enema at 4 p. m., which produced a slight movement of the bowels.

Dr. Alva S. Pinto, the attending physician of the patient, regarded that as a strong indication of perforative peritonitis, and called Maj. Ira C. Brown and myself in consultation. At 5 p. m., April 7, when the consultation was held, the expression was slightly anxious, the patient looked distressed and watchful against pain, and kept in the dorsal position with the knees raised and the lower extremities flexed on the pelvis. The typhoidal eruption was marked and profuse on the abdomen and chest. The abdomen was flat, very rigid, extremely tender, especially in the right iliac and hypogastric regions. The abdominal respiratory movements were controlled and lessened; respirations 18. Percussion was slightly dull over the lower part of the hypogastrium, tympanitic above that and over the lower part of the spleen. Hepatic dullness was diminished and displaced upward. The pulse was moderately full and strong, averaging about 96. The temperature was 101.4°; perspiration slight. The tongue coated, slightly brown and dry. No gastric disturbance, food retained and well digested. Sensibility and intelligence unimpaired, calm and self-possessed. Bladder empty, no urinary disturbance. Major Brown and Dr. Pinto advised operation, but preference was expressed to wait for more gastro-intestinal confirmatory symptoms. The pain became aggravated, and at 7 p. m. the pulse began to get smaller, weaker, and more rapid; temperature 101.7°. About 1 pint of urine was passed at 9.30 p. m. The bowels were moved involuntarily at 10 p. m., with vomiting of a little greenish fluid at 11 p. m. Operation was then decided upon, and the patient's removal to the surgical ward ordered.

The skin incision was 3¾ inches long, parallel to and a little to the inner side of the external border of the rectus abdominis muscle, and extended one-half inch above a line joining the center of the umbilicus and the anterior superior spine of the ileum. The peritoneal cavity was entered through the sheath of the rectus muscle. A free straw-colored serous fluid flowed out of the wound. The small intestine was brought outside the wound and inspected. Three well-defined thickened and inflamed patches were seen in the ileum. The first measured one-half inch in diameter and was located within 1 inch from the ileocæcal valve. The second measured 1¼ by ¾ inches, had a pin-head perforation near its center, and was located about 18 inches above the same valve. The third measured 1 by ¾ inch, and was 30 inches above the valve. The peritoneum here was rough and dull and presented a condition of approaching necrosis and perforation. The second patch was seen first, and was attended to immediately. The surface was cleansed: the hole was touched with nitric acid and was made to lie at the bottom of a longitudinal infold of the wall of the intestine. This was secured by a continuous silk suture, No. 1, the line of the suture running within the margins of the patch. This was strengthened by another continuous suture of catgut No. 1 running outside the limits of the patch. The area of the third patch was next infolded in the same manner and secured by only one continuous catgut suture. The first patch was so near the valve that the meso-appendix was grafted over its surface and held by a continuous catgut suture that joined the free edge of the meso-appendix to the farther margin of the patch.

The peritoneal exudate was serofibrinous in variety and formed no adhesion. It looked clear at first, but got turbid with fibrinous flocculas when the intestines were drawn out of the pelvis. About 1 pint of fluid was evacuated. The abdominal cavity was mopped with sponges, intestines wiped and returned. Three large drains of twisted iodoform gauze were introduced, one into each iliac fossa and one into the pouch of Douglas, and were brought out of the lower angle of the wound. The rest of the peritoneal wound was closed by a continuous catgut suture, the other layers by cross silkworm-gut sutures. Perfect coaptation of the edges of the skin was secured by intervening superficial interrupted silk sutures. The operation started thirty minutes after midnight and lasted about one hour. Anæsthesia was begun with chloroform and continued with ether.

During the first three days after the operation, strychnine was given hypodermically every four hours regularly: nutritive and stimulant enemata twice daily; morphia and atropia, together or separately, as indicated. Fluids were given early, but cautiously, in small regular doses. Ten grains of calomel were given at 11 p. m., April 8, and an enema at 6 a. m. next day: the bowels responded slightly, but moved freely twice in the night of April 9. The catheter was used only once, on the first day, 18 ounces of urine being removed: markedly acid: dark lemon in color; sp. gr. 1,028: no trace of albumin. During the first day the patient was perfectly conscious, bright, and very comfortable. All pain disappeared after the operation. He was nauseated at times, and vomited three times a little greenish fluid and mucous. The temperature kept between 97.6 and 98 all day and next night; the pulse was of satisfactory quality, and ranged between 88 and

110: its rapidity chiefly due to atropia and whisky. During the second day the temperature rose to 100 and the pulse to 114 at one time, but kept of good quality. During the third day the temperature increased again, but the pulse resumed its proper strength and rapidity; was full and regular. There was no pain nor tenderness in either wound or abdomen; no discharge to mention; no gastro-intestinal disturbance whatever.

The wound was dressed first on April 12. The dressing was dry; the coaptation in the upper part of the wound was perfect; healing primary. The drains were removed and a little slimy whitish discharge squeezed out. The right iliac and pelvic drains were replaced by smaller ones, and the lower part of the wound stitched. Stitches and drains were removed at the third dressing on April 19, when only one-half inch of wound was left open at the lower angle. Healing was complete on May 7. After April 10 all medication was cut down, only strychnia and champagne were continued by mouth. No incident of any account occurred after that. The course of the fever ended on the 18th. A relapse started on April 22, and ended on May 7. The fever was moderate and caused no distress at any time.

The first course of the fever lasted twenty-five days, the relapse sixteen days. The bowels tended to constipation all through the course of the disease. The perforation, in my opinion, started on the thirteenth day of the disease. Pain was the first, constant, and most distressing symptom. Shock, whether due to the perforation or operation, was the cause of low temperature. The perforation was insidious, marked by no sudden reduction of temperature or sudden change of pulse. Gastric symptoms were awaited for confirmation. The first vomiting occurred about eighteen hours after the perforation. Similar tenderness and rigidity of the abdominal muscles were observed in another case of typhoid fever due to hemorrhages into all the abdominal muscles. The peritoneal infection was evidently not very virulent; no culture was made of it. Perforation peritonitis has occurred oftener than was expected during the typhoid fever epidemic of Camp Cuba Libre and Camp Columbia. Being often insidious, it was not always known before death. It was the immediate cause of death in eleven out of thirty-two autopsies done by myself on typhoid fever.

Typhoid fever with perforation; operation; death; reported by T. W. Jackson, acting assistant surgeon, Pinar del Rio, Cuba, June 4, 1899.—Private James H. Davis, Troop C, Seventh Cavalry, aged 26, was admitted to the post hospital, Pinar del Rio, May 20, 1899, suffering with fever of a moderate degree. There was nothing significant about the condition of his bowels at the outset. Constipation and slight diarrhea occurred alternately, followed later by some pain in the abdomen, and the tongue gradually took on an appearance suggestive of typhoid fever. Upon the 27th instant a drop in the temperature occurred, with the onset of hiccough and vomiting, but with only a trifling amount of abdominal pain. No food was borne by the stomach, but small amounts of iced brandy and champagne were retained. It seemed likely that perforation occurred May 27 and that the hiccough and vomiting were referable thereto. Maj. S. P. Kramer, of Military Hospital No. 2, Havana, chanced to be at this hospital May 29, and concurred in the clinical diagnosis of typhoid fever, but subjected a specimen of the patient's blood to an examination for the malarial organism and to the Widal test for typhoid fever, with negative result in both instances. This left the diagnosis somewhat in doubt, and the symptoms of obstruction and peritonitis having become apparent, the possibility of an inflammatory bowel condition, surgical and nontyphoidal, was considered. High colonic flushings failing to bring away fæcal matter, and the collapsed condition of the patient growing progressively worse, his desperate condition was explained to him, operation offered and accepted, all with the knowledge that only the smallest chance of recovery, with or without operation, existed. Maj. W. F. de Niedman, Drs. Alden, Bruning, Lundy, and Jackson concurred in the opinion that operation offered the only possible chance of recovery. The patient went upon the table at 10 p. m. May 30, with a pulse rate of 140 per minute. The anæsthetic was carefully administered and hypodermatic stimulation was continued throughout. An incision over the cæcum revealed adhesions and an abscess cavity in the right inguinal region. Abdominal cavity contained about 4 ounces of pus. Small intestine was obstructed by adhesive inflammation of adjacent coils. The condition of the patient was so critical as to prevent further investigation, and the abdomen was quickly flushed with 2 liters of normal saline solution, adhesions were separated, and the abscess cavity drained and walled off as completely as possible with gauze, the incision being left open and packed with gauze. The appendix vermiformis was inspected and found to be uninvolved and normal. Patient was taken from the table and lived for more than an hour. After death a further examination revealed typhoid lesions of the ileum, a perforation one-fourth inch in diameter opposite to the abscess cavity, and a typhoid ulcer just upon the point of perforation, the serous coat of the intestine alone remaining.

Lieut. Walter Cox, assistant surgeon, United States Army, has invited attention to the probable existence in Puerto Rico of other febrile infections than those of typhoid and malarial fevers.

Case of Malta fever, reported by Lieut. Walter Cox, assistant surgeon, United States Army, San Juan, Puerto Rico, July 14, 1899.—On arriving in the general hospital at San Juan in February of this year my attention was attracted to the peculiar temperature curves shown by some of the fever cases in the hospital, and on being put in charge of the clinical examination of the blood, etc., I soon found that we should probably have to look to other explanations than malaria and typhoid for a satisfactory cause in explaining them. Having read Dr. Musser's interesting report, in the Philadelphia Medical Journal for December, of a case diagnosed by him as Malta fever in an officer who contracted his disease in Puerto Rico, I lost no time in the attempt to find whether any of our cases might also be due to a similar infection, and in this connection would like to bring to your attention one in particular which seems to me to support Dr. Musser's conclusion that this island may be an endemic focus of this disease.

The patient was a private of the hospital corps, 30 years of age, who was admitted to the hospital January 14, 1899, with a fever diagnosed as remittent malarial. He had been well during his service in the campaign and at Guayama, but had some trouble and was tried by court-martial and sentenced to a three months' term in the guardhouse of the old Spanish barracks, a place he described as, at that time, terribly foul and damp. Here he contracted his fever. He was in the guardhouse from December 25, 1898, to January 14, 1899, the fever commencing January 11. On admission he complained of pain all through his body, especially in his bones and joints. He had two chills on successive days when first taken; none afterwards. He felt ill and stupid. His appetite was poor and he slept poorly. Bowels at first loose, but later constipated. No urinary disturbance. The temperature continued with marked daily remissions, on some days as much as 3°, till he came under my observation, February 10, when he was noted at once as an unusual case. The temperature came to normal gradually, being normal in the morning and 101° or 102° in the evening, and beginning February 27 he had several days of apyrexia. Then a gradual rise came on, and on March 15 his fever reached 104°, again coming to normal March 27. He was discharged from the hospital on April 3, having had 6 days of apyrexia, but was readmitted April 7 with another recrudescence, the temperature being 102°. His fever fell to normal in several days. He was discharged from the Army April 15 and left for home two weeks later. I saw him just before he left, and he said he had had one or two feverish evenings after discharge.

Here, then, was a low fever lasting from January 14 to April 15 (ninety-one days) and showing the typical undulatory character and marked daily remissions which were noted by Dr. Musser. Repeated tests for the malarial organism were made by me and nothing suspicious found. Quinine had no effect on the temperature. The Widal reaction with a delicate organism, tested in other cases typically typhoid, was entirely negative, there being no reaction even with low dilutions. Through the kindness of Dr. Welch, of the Johns Hopkins, I was enabled to obtain a culture of the micrococcus melitensis of Bruce, and on testing the blood there was marked agglutination in dilutions as high as 1 to 60 in twenty-five minutes. The dilution of 10 and 1 to 20 showed marked reaction in five minutes. Normal serum and the blood of a typhoid patient produced no visible effect on the organism. It is evident, therefore, that clinically, and also by the serum test, this case supports the view that Malta fever may be endemic here; and the fact that there were so many cases in this hospital of fever certainly not typhoid, in which the malarial organism was not demonstrated and on which the administration of quinine had no effect, makes it probable that many more cases might have been proven to belong to this type.

MALARIAL DISEASES.

The total number of admissions for malarial diseases in the Regular Army during the calendar year 1898 was 32,393; the number of deaths, 151. The admissions constituted nearly one-third of the total number admitted for all causes of disability. They were distributed thus:

	Cases.	Deaths.
Intermittent fevers	21,827	9
Remittent or continued fevers	8,183	61
Pernicious fevers	273	77
Cachexia	2,110	4

It is now well known that many cases of typhoid fever were reported on regimental medical records under the diagnosis of remittent malarial fever. A failure to recognize typhoid fever in its earlier stages and in its milder manifestations is not to be regarded as reflecting on the qualifications of the average physician at the present time. Mistakes in diagnosis have been made in all parts of the world where the two diseases prevail in the same locality. In India for many years British medical officers denied that typhoid fever existed there as an endemic disease, and, the ravages of this fever being attributed to malaria, the malarial fevers of India and other tropical countries became invested with a reputation for unusual malignancy and intractability.

The true character of a typhoid outbreak, mistaken by regimental surgeons in the first instance for malarial fever, was usually discovered at a later date, when the mistake was rectified so far as the medical records and reports were concerned. It is readily seen that there could not have been a large proportion of typhoid infection in 8,183 cases of fever in which the deaths amounted to only 0.75 per cent of the cases. On the other hand, it is likely that included among the recorded remittents is a certain percentage of cases of mild typhoid, the addition of which would make but little difference to the rates of remittent fever, although this loss to the records of typhoid fever would affect the calculated rates of this fever by in some degree lessening its rate of admissions and increasing its percentage of fatality. The differential diagnosis of typhoid and malarial fevers can be made at an earlier date and with much greater certainty by a microscopic examination of the blood and the application of the Widal test than was practicable before the discovery of the malarial parasite and of the specific agglutinating action of blood serum from a typhoid case upon a culture of the bacillus. But these scientific studies are so recent that the profession generally still depends upon specially trained experts for their application to the diagnosis of doubtful cases. It is to be hoped, however, that the time is not far distant when every qualified practitioner of medicine will be prepared to apply these invaluable means of diagnosis.

The rate of admission for malarial disease in the Army as a whole was 694.64 per thousand of the strength; the death rate, 3.24. This is nearly a tenfold increase on the admission rate of the Army for the year 1897, in which the malarial death rate was only 0.04 per thousand of strength. The negro is generally considered to be less susceptible to malarial infection than the white man. This opinion is, however, not sustained by the present statistics, for malarial fevers appear to have been not only of more frequent occurrence but more dangerous among the colored troops than among the whites. The admission rate of the latter was 683.84, while that of the colored regiments was 834.73, and the death rates were, respectively, 3.16 and 4.21. It is possible that cases of yellow fever may have been included in the figures which yielded these rates, for the Twenty-fourth Infantry (colored) did guard and police duty at the hospitals in Siboney and its members responded promptly to a call for volunteers to do duty in the yellow-fever wards.

Of the arms and corps of the service the infantry had the largest rates, 986.82 admissions and 5.50 deaths per thousand of strength.

In Cuba the admission rate was 1,174.54, a rate somewhat greater than that of all other diseases combined. The death rate was 13.11 per thousand of strength, the deaths constituting 1.11 per cent of the cases. The admission rate in Puerto Rico was 909.33, the death rate 5.70. In the Philippines these rates were 429.56 and 1.72, respectively, and in the United States 655.82 and 2.24, the high ratios in the last instance being due to the return of invalids from the islands.

The monthly admission rates were less than 2 per thousand of strength during the first three months of the year, and they rose but little above this during the next three months. In July the prevalence of malarial disease became greatly increased, the admission rate for the month being 52.14 per thousand of strength. The maximum was reached in September, which had a rate of 129.69 per thousand.

Maj. Jefferson R. Kean, United States Volunteers, Chief Surgeon of the Department of the Province of Habana and Pinar del Rio, states in one of his reports that the use of mosquito bars by the troops has been very general and productive of a marked diminution of the number of malarial cases. He says that—

> The rôle of the mosquito in malarial infection not being generally understood by line officers. the mosquito bars have, as far as I can learn, been usually left behind as an article of luxury when troops have gone on detached service. In consequence there has been very marked and severe infection of these detachments. This cause is believed to have contributed much to the large sick rate at Pinar del Rio Barracks, and in the case of Troop F, Seventh Cavalry, which was in the field for about two weeks in June, over 50 cases of fever occurred in the ten days after return to their post at Camp Columbia.

Acting Asst. Surg. F. W. Fabricius, on duty as pathologist at the general hospital, Santiago, Cuba, made a study of a number of cases of malarial fever and reported his results to this office.[1] He occasionally encountered the benign forms of the malarial parasite, but as these were mostly found in soldiers and civilians from the United States he inferred that the infection antedated their arrival in Cuba, particularly as in many instances this inference was sustained by an inquiry into the previous history of the patients. The malignant type, however, seemed to be the endemic form of the parasite in Santiago and its vicinity.

> The pigmented and unpigmented malignant quotidian parasites are notably abundant in the native as well as the foreign element. They appear as minute amœboid bodies, with constant tendency to ring formation; after a few seconds of rest they would diffuse themselves through the cell substance, almost disappearing from view. They seem to obtain nutrition in this manner in their early phases, precipitating fine black pigment in the one but not in the other variety. The two types have not been found associated. The unpigmented forms were very frequently found in dark bronzed red blood cells. The number of these parasites

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[1] Dr. Fabricius died June 25, 1899, of yellow fever.

in the circulation must be enormous; in one field as many as 18 hyaline bodies were found (one-twelfth oil immersion—Bausch and Lomb). The crescents in both these varieties seem to be nearly alike: they are smaller, but thicker than those found in the tertian malignant form. The central cluster of pigment is rather fine, and gradually arranges itself in the form of a fine network, the crescentic body contracting—i. e., becoming shorter and rounder. Their resisting power must be very marked, for one was observed undergoing gradual changes for a space of six hours, assuming a finally rounded form, the central pigment resembling a delicate coil of black thread.

In the malignant tertian variety the parasites were found to be much larger than in the malignant quotidian, ranging in size from a third to two-thirds of that of a red blood cell, with very fine, active black pigment. The earlier stages are amœboid, but these movements gradually cease. The crescentic form is larger than in the malignant quotidian, and the central pigment coarser and more active; they are frequently found adherent to the red blood cell.

Mixed types were also met with. In one case only crescents were found, the patient being under observation for two weeks. He was very anæmic and had an enlarged spleen, but was practically free from fever. In three cases of malarial hæmaturia, or rather hæmoglobinuria, a few hyaline unpigmented bodies were found, some fully formed pigmented parasites, closely resembling but larger than the malignant quotidian, with very fine yellowish-brown pigment. Only one case presented crescents. The light color of the pigment is probably due to deficiency or marked dimunition of the hæmoglobin.

Dr. Fabricius found malarial disease presenting so many different forms that it led to fatal errors in diagnosis by closely simulating grave organic and nervous lesions. In his report he extols the value of a hypodermic or intravenous injection of a combination of quinine and urea (quinine dihydrochloride carbamide, containing 69 per cent of anhydrous quinine). This dissolves in an equal quantity of distilled water, and the solution being alkaline, the quinine is not precipitated by coming in contact with the alkaline liquids of the body, and is therefore readily absorbed. In cases of malarial hæmaturia 30 and even 40 grains have been given with good results without any apparent harmful effect from the urea in the combination. Cuban physicians seem to regard all cases of hæmaturia as of malarial origin and give rather large doses of quinine, but, notwithstanding this, their mortality is said to be high. It may be, as believed by Dr. Fabricius, that quinine in large doses does harm when the plasmodium is absent from the blood, but is decidedly beneficial when the plasmodium is present; in other words, when the hæmaturia is really of malarial origin.

Acting Asst. Surg. Bat Smith, also on duty at the general hospital, Santiago, Cuba, considered all cases of the disease known as malarial hæmaturia to be the effect of a destruction of the red blood corpuscles by a continued exposure to a malignant malarial influence. In an elaborate report which he rendered May 23, 1899, he refers to the views held by many medical practitioners in the Southern States to the effect that the use of quinine is dangerous in such cases. He cites the generally fatal issue of these malignant attacks when treated with quinine and explains this by the harmfulness of the diuretic action of the drug on the already congested kidneys. According to his observations the lesions found in the kidneys are by far the most important revealed by post-mortem examination. These organs are of a dark bluish color, with occasional darker spots, and many of the malpighian corpuscles and tubuli are filled with coagulated blood. The skin is yellow or bronzed; the muscles dark red; the heart firm and natural, except as to its dark color—in this quite different from the fatty degeneration of the yellow-fever heart; the lungs seldom engorged. The stomach is congested, its contents black or greenish and acid. The liver is enlarged, of a dark slate color exteriorly and bronzed in its interior from deposits of dark-colored pigment; the gall bladder distended with black viscid bile, and the spleen enlarged, soft, and friable. The brain frequently shows congestion, opacity of the arachnoid, and effusion into the subarachnoid space and ventricles. The ganglia of the sympathetic system are tinged yellow and are said to be thus markedly different from the rose-tinged congestion that characterizes them in yellow fever. Concerning the clinical distinction between this disease and yellow fever, he states that—

> The color in yellow fever is not so intense, and it never assumes the deep bronze hue of malarial hæmaturia. The latter disease is marked, as a rule, by well-defined remissions; the former is not. In yellow fever there is a great tendency to hemorrhage from the gums; in malarial hæmaturia this is not the case. The tongue in yellow fever is furred in the center, pointed, and of a bright red on the edges and at the tip. In malarial hæmaturia we find, as a rule, a heavily coated tongue, and gums that are of a peculiar leaden hue, which has given to the disease in some country districts the name of lead jaundice. It is true that we have discoloration of the conjunctiva in malarial hæmaturia, but it is not accompanied by the markedly engorged condition of the blood vessels of the eyeball that we find in yellow fever. There exists in yellow fever a peculiar condition which is absent in malarial hæmaturia, and that is capillary stagnation. Owing to this the finger nail drawn across the chest of a yellow-fever patient will leave a white mark which will not readily disappear. This stagnation of blood in the capillaries gives the patient in yellow fever a swollen, bloated appearance; and also gives rise to a remarkable expression of the face, which is difficult to describe. There is often an anxious, terrified look upon the patient's face, as if he were threatened by some indefinable and unknown danger. Vomiting in malarial hæmaturia is frequently an early symptom; in yellow fever, except in rare cases, black vomit usually begins but a short time before the fatal termination of the disease. The vomited substance in malarial hæmaturia contains large quantities of blackish green, grumous and disintegrated bile, blood being rarely present. The black vomit of yellow fever consists chiefly of blood, together with epithelial cells and disintegrated portions of the mucous membrane of the stomach; bile is absent. The reaction of black vomit is alkaline, owing to the presence of ammonia from the decomposition of urea. The reaction of the vomit of malarial hæmaturia is acid. In malarial hæmaturia the albumen in the urine is of a deep reddish-brown color. In yellow fever it is generally more abundant, and its color is a golden yellow.

Dr. Smith's remarks on the treatment of the disease with the cases submitted by him from his experience at Santiago, Cuba, are as follows:

> There is no doubt that the termination of any case of malarial hæmaturia will depend greatly upon the extent of the lesions in the kidneys, and it is a matter of great importance to eliminate the materies morbi, and so shape our therapeutics as to reestablish in the shortest time possible the functions of the different organs in equally balanced activity. Now, we know that the tubuli uriniferi are filled, to a great extent, with coagulated blood, and a large number are almost totally denuded of their pavement epithelium (endothelium) by reason of the congested and inflamed condition of the kidneys. We know also that the function of this pavement epithelium is to separate from the blood certain substances which are the result of chemical action in the body. Chemical analysis shows that eleven-twelfths of the urea, which should pass out of the system through the kidneys, is retained in the circulation, and should relief not be speedily obtained the patient will most surely die of uræmic poisoning. It is also well known that the simpler the tissue of a structure the more rapidly it is regenerated, and of all the anatomical elements the epithelial cell is the simplest in structure. The indications therefore are to give the kidneys absolute rest, and to throw the entire burden of the elimination upon the skin and bowels. By so doing, and relieving the kidneys of their congested condition, the pavement epithelium will be regenerated in a remarkably short time and the renal functions reestablished.
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> The remedy which, in my experience, has given the best results is calomel in decided doses, and if we can not get the mercury to act as promptly as we would wish, it should be followed by some active hydragogue. In many cases it would be well to administer at the outset a large enema of warm water, as constipation is the rule. To encourage the action of the skin, hot mustard foot baths should

be given, and the body sponged with hot water and alcohol in some form. I have also used with great satisfaction in these cases some of the derivatives of coal tar, but more especially phenacetine, in doses of from 5 to 10 grains combined with one-fourth to one-half grain of ipecacuanha and 1 to 2 grains of the citrate of caffein. The writer is aware of the diuretic action of both caffein and calomel, but the former is, in these cases, given in small doses, and its action on the kidneys is neutralized by the diaphoretic action of the phenacetine. The calomel is administered in large doses and its action upon the alimentary canal is so energetic that the kidneys are not affected by the drug. The coal-tar derivatives should be given with caution, and the heart's action carefully watched.

Diuretics are, of all the remedies, those which are most certainly contraindicated. The kidneys are already overcharged with blood, and we surely should not add fuel to the flame. Yet, some very intelligent physicians claim to have found this class of remedies very serviceable. It seems to me, however, that to lash a crippled organ into the performance of function is unwise.

The use of hæmostatics, which are held in high estimation by a number of practitioners, has, in my experience, proven somewhat disappointing, and, although I would be far from condemning the use of ergot, gallic acid, or the elixir of vitriol in some cases where the hemorrhage is unusually obstinate, yet I would much rather rely upon some preparation of iron, and by preference the dialysed iron, which is mild and can be given in large doses, as the stomach bears it well.

The hyposulphite of sodium has been extolled by some practitioners as a highly useful remedy in malarial hæmaturia. I have given the drug a fair trial, but have found it of little use, and the verdict of other physicians with whom I have conversed on the subject is decidedly adverse.

I have always found it necessary to keep the skin and bowels acting freely until the renal functions have been reestablished, at the same time sustaining the patient's strength as much as possible. If the calomel be given in the powdered form, it acts more readily, and is too heavy to be vomited. The vomiting generally ceases when the mercury begins to act.

The disease being of malarial origin, many writers maintain that the first indication is to secure complete cinchonism as early as possible, claiming that as the hemorrhage originates during a chill, the course of treatment which prevents the recurrence of the paroxysm will mitigate the hemorrhage, if it does not stop it altogether. They therefore advocate the administration of the sulphate of quinia in large doses. In differing radically from this view of the treatment of malarial hæmaturia I am well aware that I subject myself to much adverse criticism. Yet, as far back as in the days of Orfila and Pereira sulphate of quinia was recognized as having powerful diuretic properties. This is not denied by our more recent authors. Knowing the lesions existing in the kidneys, I early refrained from giving the sulphate of quinia, or any of the salts of cinchona, preferring to rely on mercury, and on the diaphoretic action of the skin to eliminate the poison, rather than to risk aggravating the already dangerous condition of the renal organs. In this view of the action of sulphate of quinia I am sustained by most, if not by all, the physicians of my section of the country, viz, the Colorado and Brazos bottoms (Texas), where the disease is frequently met with. It would be difficult to induce one of them to administer quinine in malarial hæmaturia, even after the hemorrhage has been checked, for fear of reproducing it. * * * Considering that it is important not to permit a return of the paroxysm, and taking the view here presented of the action of quinine, we must look elsewhere for relief, calomel being chiefly relied upon. After the action of the calomel the nausea and vomiting are usually relieved, and the system is in a better condition for absorption and assimilation. Salicin may be given for its antiperiodic properties, and although the drug can not always be relied upon, it frequently proves a good substitute for the more dangerous salts of cinchona. The cold infusion of wild cherry bark and tincture of cinchona is a great favorite with the physicians in south Texas, especially during the stage of convalescence. To this may be added, after the danger of its combination with calomel shall have passed, a drop of nitro-muriatic acid.

The blood being much depraved in malarial hæmaturia, this condition should be corrected as speedily as possible by giving the patient good, nutritious food. Among the wines, the best seems to be a good claret. The salts of the blood should be replaced at this stage, and for that purpose the phosphates of lime, sodium, and potassium are the most available. The muriated tincture of iron in combination with chlorate of potassa is also a valuable remedy.

Malarial hæmaturia is in many localities looked upon as one of the most fatal of all diseases. I can not consider it so, yet so it will remain so long as we trust to cinchonism as a sheet anchor.

Case I.—W. F., age 65 years, a native of Ireland, by trade a pipe layer, had been in Cuba for two months. He had been sick in the town of Santiago for two weeks, when he was transferred to the detention hospital, where he remained three weeks; at the end of that time he was sent to this hospital and admitted to ward 6, January 3, 1899. The patient stated that he had no other treatment, either in town or at the detention hospital, except very large doses of quinine daily.

The symptoms presented by this case were characteristic of malarial hæmaturia. The skin was of a deep yellow color. The conjunctiva was discolored by bile, but its blood vessels were not engorged, as in yellow fever; nor could I detect the peculiar capillary stagnation in the skin which we find in that fever. The tongue was broad and flabby, indented on the edges and heavily coated, of a dark, yellowish-green color. Temperature at 2 p. m. 105°, pulse 106. At 4 p. m., temperature 104.7°, pulse 104. At 10 p. m., temperature 103.2°, pulse 90. After this the pulse began to fall, being next day, at 8 a. m., 80, with a temperature of 100.4°. At 12 m. of the same day the thermometer registered 103.4°, pulse 90. At 5 p. m., temperature 102.6°, pulse 85. January 5, temperature at 8 a. m. 99.4°, pulse 80; at 5 p. m., temperature 103.2°, pulse 90. January 6, morning temperature 102°, pulse 80; evening, 103° and 85. January 7, morning temperature 99.2°, pulse 78; evening, 102° and 82. January 8, morning, 98° and 60; evening, 98° and 60. January 9, morning and evening, 98° and 58. January 10, morning, 98.5° and 48. January 11, morning, 98.5° and 75. From this date the temperature and pulse were normal and the patient's recovery was rapid.

The urine in this case, on the day of admission, was of a black color, with a reddish cast, containing blood, bile, and albumen in large quantities, also many casts of the tubuli uriniferi and epithelial cells. Twenty-four hours afterwards the urine showed much less blood, but still a large quantity of bile, some casts, and a little albumen. On the evening of the second day the blood had disappeared, but bile was still present in considerable quantity.

The treatment was that outlined in my special report, viz: Calomel, four doses of 5 grains each, combined with one-fourth grain of ipecacuanha and 2 grains of sodium bicarbonate, given in powder and repeated every two hours; gave also 5 grains of phenacetine, with 2 grains of the citrate of caffein, repeated at intervals of two hours until three doses had been taken. The purgative acted promptly and the diaphoretic action of the phenacetine was very satisfactory. Quinine was withheld altogether. There was no vomiting, fortunately for the patient, as he was very weak. On the third day 30 grains of salicin, in five doses of 6 grains each, were given; also dialysed iron, 30 drops in water, every four hours. On the fourth day the salicin was discontinued and the patient was placed upon a treatment of the tincture of cinchona and fluid extract of wild cherry before meals and dialysed iron after meals. On the tenth day after admission 3 drops of Fowler's solution were added to each dose of the cinchona and wild cherry, and this, with the dialysed iron, which was given separately, was continued for several weeks, the patient improving rapidly. In this case, as in those which follow, the plasmodium was clearly to be seen on the first day, but after the patient had come fully under the influence of phenacetine it disappeared. This I have noticed with the other coal-tar derivatives; they seem to destroy the plasmodium more rapidly than quinine.

Case II.—B. D., age 28 years, a native of Illinois, private in the Hospital Corps, came to Santiago with the Fifth United States Infantry, in August, 1898. Patient states that he has suffered from malarial fever ever since his coming to the island, being rarely free from it. He was given large doses of quinine, but with negative results. He was in the regimental hospital for two days before being sent to this hospital, where he was admitted on March 22, and sent to ward 6, the diagnosis from regimental hospital being malarial fever (intermittent). This patient presented all the symptoms of malarial hæmaturia. His mind was not very clear; he seemed rather stupid. The skin was of a deep greenish yellow or bronze, but there was no capillary stagnation; eyes much discolored by bile, but the vessels were not congested; tongue broad and flabby and indented on the edges, heavily coated, greenish yellow; gums of a leaden hue; tenderness over the stomach, but no vomiting. Plasmodium in the blood for the first two days, then it disappeared; red blood corpuscles very pale and diminished in number; large deposits of pigment in white corpuscles. Urine in rather large quantity, showing a large amount of bile and blood, color almost arterial red. In this case the blood was in such large quantity that it formed a clot in the bottom of the vessel. Microscopical examination revealed epithelial cells, and numerous casts of the tubuli uriniferi, also numerous red blood corpuscles. The temperature was never very high and the pulse was rather slow, but full and strong.

Date.	Temperature.			Pulse.		
	8 a.m.	12 m.	8 p.m.	8 a.m.	12 m.	8 p.m.
	°	°	°			
March 22	98.2	97	100	70	65	80
March 23	99.4	100	99.8	72	80	78
March 24	100	100	100	78	78	78
March 25	99.4	100.4	100.4	72	78	78
March 26	98	98.4	100.4	72	75	80
March 27	98	98.4	100.4	72	76	80
March 28	98	99	98	70	72	75
March 29	99	98.4	100.4	71	72	78
March 30	99	98	99.6	65	65	65
March 31	98.4	99	100.4	56	56	58
April 1	98	98.5	99.4	56	56	56
April 2	99	99.5	100	52	56	56
April 3	98.5	98.5	100.2	52	56	56
April 4	98	98	100	48	48	50
April 5	98.4	98.4	100.4	42	45	48
April 6	98	98	100.8	42	45	46
April 7	98	98	99.2	70	75	76
April 8	98.5	98.5	98.5	75	75	75
April 9	98.5	98.5	98.5	75	75	75

The treatment was practically the same as in No. 1. On the second day the blood had disappeared from the urine, but bile was still present in considerable quantity. The urine became almost normal on the fifth day. Plasmodium disappeared on the third day. No quinine whatever was given to this patient. On the fifth day the following treatment was begun, viz: Simple tincture of cinchona, fluid extract of wild cherry, and Fowler's solution combined, before meals, and the tincture of the muriate of iron after meals. Recovery rapid and satisfactory.

Case III.—J. E.; age, 24 years; a native of North Carolina, and private in Company F, Fifth United States Infantry; in service twenty-three months; came to Cuba last August. Sick more than one-half the time since coming to the island. Sick for ten days previous to his admission to this hospital. Had been given large doses of quinine from day to day without apparent benefit. Admitted to ward 6 April 12, 1899. Color, deep yellow, bordering on bronze; tenderness over the stomach, but no vomiting; eyes yellow, but blood vessels of conjunctiva did not show a congested condition; tongue broad and indented; coat of tongue greenish yellow; gums of a leaden hue. Temperature, 101.2°; pulse, 90. Blood showed plasmodium distinctly, which disappeared on the third day. Urine, in rather large quantity, contained a great deal of blood, bile, and albumen, casts of tubuli uriniferi, epithelial cells, and pus.

The treatment was identical with that described in No. 1. No blood found in the urine on the second day, but still a large quantity of bile and a considerable amount of pus. The urine cleared up entirely on the fifth day, but some pus could be discovered until the eighth day.

The temperature in this case was never very high, being 101.2° on the first day, reaching 102° on the third, and 102.8° on the fourth day. It then varied from 100° to 100.8° until the morning of the 19th, the seventh after his admission, when it fell to 98.5°, after which there was no further rise. The pulse never went over 90, and on the evening of the fourth day began to fail steadily until the morning of the 22d, when it went as low as 42, being full and strong; on the evening of that day it rose to 75, and afterwards remained normal.

Case IV.—A. K.; age, 28 years; native of Indiana, and sergeant, Company A, Fifth United States Infantry. Came to Cuba in August, 1898. Sick most of the time since coming to the island. Sick for about ten days before he came to the hospital. Admitted to ward 4 April 18, 1899. Symptoms similar to those described in Case III, with the exception that his color was a pronounced bronze. Urine showed blood, bile, casts of the tubuli uriniferi, and epithelial cells. The blood also showed plasmodia, which disappeared on the third day. The temperature in this case never went over 102.8°, which was on the day of admission. It steadily decreased until it became normal on the 23d, five days after his admission. The pulse was never over 88, and fell rapidly from the third day, going as low as 42 on the 23d and 38 on the 24th, or sixth day. On the 25th it rose to 76 and remained normal afterwards. Treatment the same as in the other cases, no quinine whatever being used. This case was of much shorter duration than the others, the patient being convalescent on the seventh day after admission. His recovery was remarkably rapid.

Case V.—R. E.; age, 19 years; a native of Kentucky, and private in Company H, Fifth United States Infantry. Admitted to this hospital March 23, 1899, and assigned to ward 6. This patient when admitted was almost in a stage of collapse, temperature subnormal, respiration hurried, pulse very small, rapid, and very weak. After using stimulating hypodermic injections the temperature rose from 96° to 97° and then to 98°, and eventually, after several hours, to 99°, but fell again next morning to 97° or a little below that point, the heart's action being very weak and rapid. The temperature rose again to 98° and then to 101°, but did not long remain up to that point, falling rapidly to 97°. Vomiting was almost incessant and very distressing. The substance vomited was of a dark, greenish black, containing no blood, but a large quantity of viscid, disintegrated bile of an acid reaction. The bowels were constipated. Small doses of calomel and soda were administered, also an enema of warm water, followed a few hours afterwards by a second enema of warm soapsuds, castor oil, and glycerin; a rather copious action was thereby produced, but the vomiting was not relieved. The patient could not retain nourishment of any kind, nor cold drinks, such as cracked ice and champagne, or iced apollinaris water. All remedies employed to allay the sick stomach and arrest the vomiting proved useless. When admitted the urine was of a dark, reddish-brown color, and contained blood, bile, casts of the tubuli uriniferi, and epithelial cells. On the 25th the urine was of a much lighter color and contained no blood; it was, however, in very small quantity. On the morning of the 26th the flow of urine ceased altogether, and the patient was in a semicomatose condition. All efforts to reestablish the functions of the kidneys were unavailing, the patient showing all the symptoms of uræmic poisoning. He became delirious during the day, and during the night of the 26th he had several hard convulsions, and died at 6.30 a. m. March 27. The symptoms in this case were characteristic of malarial hæmaturia in its worst form. An autopsy held a few hours after death fully confirmed the diagnosis.

Case VI.—P. H., a native of Ireland; age, 22 years, and a private in Company B, Fifth United States Infantry. Sick in camp at San Luis, province of Santiago de Cuba, for nine days before entering this hospital. Admitted to ward 6 April 18, 1899. Temperature a few hours after admission, 103°; pulse, 124; next morning, at 8 a. m., 101° and 112; evening, 102.4° and 122. On the 20th, at 8 a. m., 103.4° and 126, and at 8 p. m., 103.6° and 130. On April 21 the morning temperature was 104.4°, falling to 104° by midday and 103° by 8 p. m., the pulse being, at 8 a. m., 135; at 12 m., 130, and at 8 p. m., 125. On the 22d the temperature had dropped to 100.3°, with a pulse of 104; there was, however, a rise toward evening, the thermometer showing, at 5 p. m., 103°; pulse, 122, and at 8 p. m., 103.8° and 126. Next morning at 8 a. m. temperature, 104.2°, with a pulse of 134; evening, 104°; pulse, 130. On the 24th the morning temperature was 98°, with a rather small, feeble pulse of 86; evening, 103°; pulse, 128, small and weak. A marked change for the better occurred during the early part of the morning of April 25, the thermometer registering 99° at 8 a. m.; pulse, 100; at 12 m., 98.5° and 90. No further rise of temperature occurred in this case, and the pulse fell steadily until it reached the normal, both as to rate and volume.

When this patient was first admitted and it was discovered that he passed blood with his urine I was inclined to think that he also was suffering from malarial hæmaturia, but upon examination it was plainly to be seen that the leading symptoms of the disease were wanting. The skin was very pale, no yellow cast whatever. The conjunctiva was pale and not at all discolored by bile. The pulse was hard and rapid and the patient at times rather drowsy. The examination of the urine showed but a trace of bile; blood, on the other hand, was present in considerable quantity, also casts of the tubuli uriniferi, but these were not discolored by bile as they are in malarial hæmaturia. No plasmodium was found in the blood, yet I have no doubt that the patient was affected by malarial poison to a limited degree, but I do not think that it had any bearing upon the condition of this patient's kidneys. The history of this case, together with the symptoms presented, justifies the diagnosis of acute nephritis. The man had been with a mounted detachment of his regiment and had been exposed to a heavy rain all day, sleeping on the wet ground at night without a change of clothing, being, as he himself expresses it, "soaked through." Next morning he complained of severe pain in the lumbar region, which was accompanied by stiffness and high fever. I have reported this case to demonstrate the difference in the symptoms presented in malarial hæmaturia and acute nephritis, and especially to call attention to the remarkable difference in the character of the pulse in the two diseases.

Occasionally during the year cases of malarial infection presented such characteristics as to lead to grave suspicions of the presence of yellow fever. One such case at Key West, Fla., in July, 1898, gave rise to much anxiety. A similar case was reported by Maj. S. T. Armstrong, chief surgeon, department of Puerto Principe, in the person of a soldier of the Eighth Cavalry, who was received into the hospital April 27, 1899, with high fever, but with no symptom calling attention to any particular organ. On the evening of March 3 suspicion as to the character of the case was aroused by the man's restlessness, muscular pains, nausea, and rapidly developed icterus. His history, facial expression, tongue, pulse, and temperature were not significant, and although there was hepatic tenderness, there was no albuminuria. Five slides on different occasions gave negative results in an examination for plasmodia. The patient died March 5, and no satisfactory evidence of the cause of death was discovered by the medical men who were present at the post-mortem examination. Surface of body and serous membranes icteroid; heart flabby, otherwise normal; lungs normal. Stomach contained a greenish liquid; no peritonitis; some congestion, but no ulceration of the intestines; spleen soft and mottled; liver enlarged, but of normal texture; gall bladder distended. Two ounces of slightly acid, straw-colored urine of specific gravity 1010 and containing 2 per cent of albumen found in the urinary bladder. Specimens from the organs were examined March 30, 1899, at the Army Medical Museum, Washington, D. C., the lesions found being typical of pernicious malarial infection:

The liver shows a cloudy swelling of its epithelium, with an absence of some of the cell nuclei. The capillaries of the organ are conspicuous throughout by the large deposits of malarial pigment in their endothelial cells, while the branched cells of Kupffer and many swollen mononuclear cells lying free within the blood vessels also contain melanin granules. The evidences of fatty change are extremely slight, and there is a complete absence of the advanced necrosis found in yellow fever.

In the kidney cloudy swelling and some degeneration of the epithelium is observed, with deposits of blood pigment in a few of the necrosed cells. The glomeruli are swollen and their capsules contain a granular detritus with an occasional red-blood cell. Deposits of melanin are quite frequent in the endothelial cells of the glomerular and intertubular capillaries, as well as within the leucocytes and desquamated endothelial cells in the larger blood vessels. There is no apparent increase in the connective tissue.

The portion of spleen received is the seat of a recent hemorrhagic infract of about the size of a hazel nut. Apart from this the organ appears to be deeply congested and the larger cells of the pulp are markedly pigmented with granules of melanin.

In the heart some of the muscle fibers show segmentation of their protoplasm, but the striation is distinct and no fatty change is apparent. The remains of numerous malarial parasites are visible in the blood vessels, some of them clearly within red-blood cells, while with others the containing red cells have disintegrated. Malarial pigment is also present in the endothelial cells and lucocytes.

The section of stomach examined shows a complete necrosis of the superficial layer of the mucosa and in places the necrosis extends down to the submucosa. The necrotic débris on the surface contains cells, which are probably endothelial cells, loaded with melanin, and in addition there is a sprinkling of finer granules whose source can not be determined, perhaps the result of hemorrhages. Many of the capillaries of the mucosa are literally crowded with malarial parasites. Abundant malarial pigmentation is present in the vessels of a fragment of fatty omental tissue attached to the stomach.

Cases suggesting the advisability of guarding against yellow-fever infection were to be expected among the troops while in Cuba and immediately on their arrival at Montauk, Long Island, from Santiago, in August, 1898. As a matter of fact the isolation ward of the detention hospital was never without patients during the period occupied in establishing the Fifth Army Corps at Camp Wikoff. But even after this camp had been broken up and the troops scattered among the permanent military stations in the United States, cases were occasionally observed which occurring in a yellow-fever district and in the absence of microscopic examination of the blood would have been consigned to the wards of a yellow-fever hospital. Thus, Maj. John T. Gibbons, surgeon Forty-seventh New York Infantry, and post surgeon Fort Adams, R. I., reported that on September 27, 1898, a man belonging to Battery E, Fourth Artillery, who had contracted malarial fever while in service in Cuba, was brought to the post hospital at sick call. This man had been seen to vomit a coffee-ground liquid. He was much exhausted, temperature 103.7°, conjunctiva yellow, and tongue pointed, red, and quite unlike the ordinary malarial tongue. He was immediately isolated as a yellow-fever suspect; but as the urine was not albuminous and as the malarial organism was discovered in the blood, the case was regarded and treated as one of æstivo-autumnal fever. Under the influence of quinine the temperature fell, although the patient remained anemic during a prolonged convalescence.

The difficulty with which the malarial organism was eradicated from the system of patients who had suffered from fever at Tampa, Fla., or in Cuba was a marked characteristic of the disease. According to many observers the patients were anemic and flabby, with sallow complexion and abdomen enlarged. They had irregular febrile attacks and the diseased condition was said to be not materially affected by the administration of quinine. At Fort Ethan Allen, Burlington, Vt., a station perfectly free from local influences of a malarious character, there occurred, in November, 1898, 68 cases of malarial fever in a command of 608 men which had participated in the Cuban campaign. Thirty-two of the 68 cases were recurrences in men who had already suffered while at Fort Ethan Allen; but 36 were cases in which there had been no fever for many weeks. Some of these, in fact, had been free from febrile manifestations since their return from Cuba in August. In most of these cases there was no chill, the onset being marked by a temperature of 103° to 105°, which gradually fell to the normal, with a recurrence in two, three, or four days.

Acting Asst. Surg. W. L. Baird, in a report from Fort Bliss, Tex., dated May 16, 1899, commented on these recurrences in men returned from Cuba, and deduced from the history of his cases the necessity for systematic treatment until the thorough removal of the malarial organism from the system. He reported 30 cases, mostly among men of the Tenth United States Cavalry, who returned from Cuba August 14, 1898, and after a stay at Montauk Point, New York, and at Huntsville, Ala., reached Fort Bliss, Tex., February 2, 1899. Twenty-five of the cases were uncomplicated and had an average duration of only seven days. The temperature was variable. In none did it rise above 103.6, and the remissions came at irregular intervals. The microscope was used for diagnostic purposes and as a guide for treatment. Dr. Baird's treatment consisted of 1 to 2 grams of quinine, daily, associated with opium (generally in the form of the camphorated tincture with fluid extract of ginger). A saline laxative was given to keep the bowels freely open. After the fever was controlled the quinine was continued for one or two weeks, and followed by roborant doses of quinine, strychnine, iron, and arsenic for a month, or until no trace of the malarial organism could be discovered in the blood. He had no recurrence in any of the cases so treated.

In the complicated cases the same antimalarial treatment was adopted and with the same favorable results so far as concerned the relief of the malarial symptoms. They were reported as follows:

Case I (malarial rheumatism).—Sergt. A. L., Troop I, Tenth Cavalry; age 37; standard weight, 181 pounds; present weight, 165 pounds; fifteen years and four months' continuous service. He was taken sick in Cuba, July 10, 1898, with fever, complicated with muscular rheumatism, most severe in the lumbar region and worst at night, preventing sleep and rest. He was furloughed on reenlistment at Huntsville, Ala., and reported here April 29, where he was taken into hospital next day. Urine normal in quality but deficient in quantity for several days. Blood exhibits all of the pathological conditions to be found in the second stage of secondary anemia; microcytes (a majority of them crenated) especially abundant. No chill nor fever after the second day. The rheumatic pains subsided gradually under 0.60 iodide of potassium three times daily.

Case II (acute malarial nephritis).—Corporal R., Troop I, Tenth Cavalry; age, 26; standard weight, 189; present weight, 177. He came on sick report March 24, 1899, complaining of chills and fever and severe darting pains in the temples and also over both kidneys, extending down the lower limbs as far as his ankles. Urine in twenty-four hours 450 c. c. acid, straw colored, specific gravity 1025; containing albumin in moderate quantity, and epithelial cells inclosing oil globules. Dry cups were applied over the kidneys three to five times a week; chloral hydrate in gram doses at bedtime to secure rest and freedom from pain; sodium phosphate 4 grams in hot water three times daily before meals. No chill nor fever was experienced after the first day in hospital; urine increased to 1,500 c. c. Pain not relieved; continues weak, especially in his legs. Appetite fair, digestion impaired, mucous membranes pale. Malarial parasites in small numbers can still be found in his blood. No decided improvement in his general condition.

Case III (chronic malarial nephritis).—F. L., Troop I, Tenth Cavalry; age, 36; standard weight, 190; present weight, 178. Taken into hospital March 21, complaining of chills and fever. Urine 4,800 to 5,300 c. c.; pale straw-colored acid, specific gravity 1005, with tubular epithelial cells filled with oil globules, and a great number of hyaline casts filled with oil. Subjective symptoms; dimness of vision, slight œdema of lower eyelids, some puffiness of his face and at times lately some swelling of hands and feet. After he had been in the hospital about ten days he had an attack of hoarseness and cough, which I attributed to œdema of his larynx, but it passed off in about a week and has not returned since No other improvement has taken place, although the patient says that he feels as well as he ever did in his life, except a little weak and unable to see well.

Case IV (malarial polyuria).—G. W.; age, 24; former weight, 163; present weight, 153 pounds. Admitted into the hospital April 1. He looked so well at first sight that after getting his history I did him the injustice to regard him as an expert malingerer; but when I took his pulse (which was 90) and his respiration (which was 26) I began to modify my opinion, and after requiring him to ascend a flight of twenty-three steps at a quick pace, and then finding his pulse at 130 and his respiration 32, I saw that I had made a serious mistake. On taking the specific gravity of his urine, it was found to be exactly 1000. I then examined a specimen of blood from his ear and found it (so to speak) swarming with the malarial parasites. The quantity of urine passed in the first twenty-four hours after coming into the hospital was 4,300 c. c., and it has constantly increased since then, until now he passes 6,200 c. c., and its specific gravity has never been over 1000. At first he had pain and stiffness in his lower limbs, but these have passed away, and he says he feels better, though his heart is growing weaker and pulse now constantly over 100. The treatment for his malaria has been the same as in the other complicated cases, except that the dose of quinine has been much smaller. Gave pilocarpine at night several times to try and relieve the kidneys by inducing perspiration; succeeded in establishing free perspiration, but the quantity of urine constantly increased. He has had neither chill nor fever since coming here; thirst moderate. [This man was discharged from service on certificates of disability June 8, 1899.]

Case V (chronic bronchitis and phthisis pulmonalis).—V. McK., age, 37; former weight, 140; on admission into the hospital, 114; present weight, 135 pounds. Came to El Paso from Cuba on sick furlough, and when it expired came into the hospital here February 5, 1899. When admitted had chills and fever, complicated with cough and expectoration of muco-purulent matter, in which were found tubercle bacilli and many forms of cocci, including streptococcus, and diplococcus lanceolatus. Abnormal fullness, with dullness at apex of left lung. Prescribed whisky 90 c. c., and cod-liver oil 45 c. c. daily for his cough: he has taken 5,220 c. c. of whisky and 787 c. c. of cod-liver oil, and his improvement is evinced by his increase in weight. No change in his expectoration or its contents.

Cases of malarial disease, complicated or uncomplicated, among the troops that had served in Cuba were to be found during the last quarter of 1898 at most of the United States military stations and in a number of the civil hospitals. The treatment of these cases was almost without exception by quinine. Thus at Fort Niagara, N. Y., Capt. J. S. Kulp, assistant surgeon, United States Army, required all the men of the garrison who had seen service in Cuba to report morning and evening at the hospital, where doses of 40 and 20 grains, respectively, were given to each man. After the adoption of this system, which was continued until the advent of cold weather, no case of fever had to be taken into the post hospital. Dr. E. M. Buckingham, who treated a number of our returned soldiers in the Boston City Hospital, became fully impressed with the necessity of continuing the treatment by quinine for a considerable period to avoid the danger of relapses. Of the patients discharged from his wards and directed to continue the quinine for a month none returned to the hospital, although there were 30 to 50 such cases living within its radius and of the class of its ordinary patients.

On the other hand, Maj. L. C. Carr, brigade surgeon of volunteers, of the general hospital, Santiago, Cuba, in a report dated February 6, 1899, claims that cases of mild intermittent malarial fever, known among the Cubans as "calentura," may be cured without the use of quinine, and presents a series of cases in which successful results were obtained without specific medication. According to his observation, quinine was used to excess by many medical officers, whose patients, when the fever was controlled, were in an anemic, depressed, and stupified condition, with the prospect of a tedious and unsatisfactory convalescence before them. He instances cases in which 100 to 120 grains of quinine were given daily, for six to eight consecutive days. He recognizes that certain types of congestive fever and algid remittents, in which the patient is in great danger from profound malarial intoxication, require the free use of quinine, and in such cases recommends the hypodermatic injection of quinine with urea, but he takes exception to a general liberal dosage as unnecessary and harmful. From his experience, given below, he concludes that cases of mild malarial poisoning when not treated with quinine have a more rapid and satisfactory convalescence than other cases of a similar character of which he had personal knowledge where the stay in hospital was prolonged for months. In these latter cases quinine was given in large doses, long continued, but the patients remained anemic with capricious appetites, the sense of hearing and nerve centers at least temporarily impaired, and with a tendency to recurrences of the malarial paroxysms.

Notes of cases of malarial fever in which no quinine was given.

Case I.—Colored civilian employee, admitted October 19, 1898, at 12 m.; temperature, 100.8°; pulse, 100°; respiration, 22°. Previous history negative. Present illness began with a chill on the morning of the 17th, followed by fever. The paroxysm recurred next day, and on the morning of admission patient was given a cold bath and placed in bed on a liquid, sustaining diet. To overcome the constipation, calomel, one-half grain, was given every hour until 2 grains were taken, followed by a saline cathartic, with satisfactory result. Antipyrin, 5 grains, was then administered and repeated at 3 p. m. The temperature at 7 p. m. was 99.2°. On the following day it was normal in the morning and the evening, having risen to 99° at noon. The temperature continued normal during his stay at this hospital.

All this time the patient appeared comfortable. No other medical treatment was resorted to excepting tonic doses of tincture of iron. The patient was discharged, recovered, on the 27th.

Case II.—Colored civilian employee, admitted October 19, 1898, at 12 m. Previous history uninteresting. His present illness began on the 17th with a severe chill, accompanied by nausea and vomiting. These recurred on the 18th and 19th, when the patient applied for treatment. Temperature on admission, 105.4°; pulse, 102; respiration, 28. Temperature was reduced by cold sponge baths given at hourly intervals. Antipyrin in 5-grain doses, was given at 2 and 4 p. m.; a saline cathartic was administered with good result. Apollinaris water and Rhine wine were ordered to combat nausea. At 4 p. m. the same day the temperature was 102°. At 7 p. m., 102.8°; pulse, 96; respiration, 22. On the 20th, 7 a. m., temperature, 100°; pulse, 80; respiration, 28. Antipyrin repeated. Tincture of iron, 20 drops, and tincture of nux vomica (Spanish mixture), 3 drops (this tincture is treble the strength of tincture of United States pharmacopœia), given three times a day. Twelve m. temperature, 100.6°; pulse, 80; respiration, 28. Seven p. m. temperature normal. There was no chill and the patient seemed to be comfortable. This condition continued until the 28th, when he was discharged, recovered. He has been in the employ of the quartermaster's department since then and has remained perfectly well up to the date of this report (January 10, 1899).

Case III.—Colored civilian employee, admitted October 20, 1898, at 11 a. m. Previous history negative. Habits good. Was taken with a chill on the morning of admission. Temperature, 104.4°; pulse, 96; respiration, 28. Received a cold bath and 5 grains of antipyrin. At 5 p. m. temperature, 102.8°; 8 p. m., 102°. Next day the temperature was normal and remained so during the entire day. Gave tincture of iron, 20 drops, and liquor potassii arsenitis, 3 drops, three times a day after meals. October 22, 7 a. m., temperature normal; 3 p. m., 100.2°; 5 p. m., 104.4°; 8 p. m., 102.6°. No chill preceded this sudden rise in temperature. Received two baths at intervals of one hour. Patient was constipated. Relieved by half-grain doses of calomel at hourly intervals until two grains were taken, followed by a saline laxative. October 23, 7 a. m., temperature normal. Continued the iron and Fowler's solution. No rise of temperature occurred subsequently, and on October 28 he was discharged, recovered.

Case IV.—White, civilian employee, admitted October 22, 1898, at 1.30 p. m., with a temperature of 102.4°; pulse, 96; respiration, 23. Family history good; denies alcoholism and specific disease. Patient received a cold bath and temperature fell to 102° Constipation was relieved by a saline cathartic. On the following day he received 5 grains of antipyrin at 9, 1, and 5 o'clock, the temperature being 101° at 7 a. m., 101.4° at 12 m., and 102 at 7° p. m. On the 24th at 7 a. m. the temperature was 99°, at 12 m. 98.4°, and at 7 p. m. 101.2°. The antipyrin was repeated. On the 25th the temperature was normal and remained so all day. He was now placed on tincture of iron and Fowler's solution, after each meal, as continuous medication. He was discharged, recovered, October 29. When seen one month later the fever had not returned and the patient seemed perfectly well.

Case V.—Colored, civilian employee, admitted October 20, 1898, at 3.30 p. m.; temperature, 102°. Previous history negative. Family history good. Present illness began ten days ago with severe chills and fever every other day. On the morning of admission he had a severe chill, soon followed by marked nausea and vomiting. He was placed in bed, on a liquid sustaining diet, and given 5 grains of antipyrin at 4 and 6 p. m. The nausea persisting, he was given creosote in small doses, with marked benefit. On the 21st the temperature was normal, and the patient appeared to be very comfortable. There was no rise of temperature on the 22d. Next day he had a severe chill at 2.45 a. m., lasting about twenty minutes. He received one-half ounce of whisky and a cold pack. At 7 a. m. temperature 101.4°. Subsequent to this the temperature continued normal. He was placed on Fowler's solution, three-drop doses, after meals. On October 28 he was returned to duty, and when last seen, about December 25, his condition was excellent and the fever had not returned.

Case VI.—White, civilian employee, admitted November 7, 1898, at 4 p. m., with a temperature of 104°. Previous history negative. Habits good. His present illness began, three days prior to his admission, with a severe chill, followed by fever. The paroxysm recurred every morning. As he was constipated, a saline cathartic was administered with good result. A cold bath reduced his temperature to 102° at 6 p. m. On the 8th at 7 a. m. the temperature was 98° and remained normal throughout the day. He was given 10-drop doses of tincture of iron after meals. On the 9th the temperature was normal and continued so until the 14th, when it rose to 99.4° at 4 p. m., when antipyrin (5 grains) was administered. On the 15th at 7 a. m. the temperature was 99°, at 12 m. 98.8°, and at 4 p. m. 99.2°. Antipyrin was repeated. On the 16th the temperature was normal throughout the day and continued so until the evening of the 17th, when it rose to 99.6° at 7 p. m.

Antipyrin was repeated. From that time his temperature continued normal. He was discharged, recovered, November 23.

Case VII.—White, civilian employee, admitted November 10, 1898, at 8 p. m., with a temperature of 102.6°. Family history good. On admission he was placed in a cold bath, the temperature falling to 100°. Antipyrin, 5 grains, was given. On the 11th at 7 a. m. the temperature was 99°, at 12 m. 99.8°, and at 4 p. m. 99°. Antipyrin was repeated at 1 and 4 p. m. On the 12th the temperature was normal. The patient was placed on Fowler's solution three times daily, after meals, for continued use. The temperature remained normal until 3 a. m. of the 14th, when a chill was followed by a temperature of 102°. He received 5 grains of antipyrin. At 7 a. m. the temperature was 101°, at 12 m. 99°, rising to 101° at 4 p. m. Antipyrin was repeated at 3 and 5 p. m. On the 15th at 7 a. m. the temperature was 99.6°, at 12 m. 98°, at 4 p. m. 98.5°; on the 16th at 7 a. m. 100°, thereafter continuing normal. Patient was discharged at his own request, November 20.

Case VIII.—White civilian employee, admitted November 12, 1898, at 6 p. m.; temperature, 102.6°. Patient was considerably nauseated and vomited several times. He received a cold bath every hour and 5 grains of antipyrin every forty-five minutes. Temperature at 9 p. m. was 104°. On the 13th, at 7 a. m., the temperature had dropped to 100°, and at 12 m. to 98°, but rose again at 4 p. m. to 105.2°. A cold pack reduced his temperature to 104°. Another bath at 5 p. m. lowered it to 102.6°, and a third, at 6 p. m., to 101.4°. Bowels were much constipated and did not respond to saline cathartic which had been administered previously, but were moved well by a copious rectal injection. At 5 a. m. of the 14th he had a severe chill, followed by a temperature of 102°. Antipyrin, 5 grains, and a cold bath caused a drop in the temperature to 100.2°. At 4 p. m. the same day it rose to 102.4°. On the 15th the temperature ranged from 97.6° to 98.5°. He was now placed on iron and arsenic after meals. The temperature continued normal until the 18th, when it registered 99° at 7 a. m., 101° at 12 m., and 101.4° at 4 p. m. He received antipyrin, 5 grains, and the temperature next day fell to 97.2°. Patient was anxious to return to work, and left the hospital in good condition on November 20. He returned a month later with an attack of acute diarrhea, but stated he had been entirely free from fever.

Case IX.—Civilian employee, admitted November 20, 1898, at 8 p. m.; temperature, 105.4°. States that on the morning of admission he had a violent chill. On the 21st at 7 a. m. his temperature was 99°, and ranged between 98.5° and 98.6° during the day. He was placed on liquid and stimulating diet, but medication was withheld. Next day the temperature was normal; stimulating diet continued, and iron prescribed. On November 27 the temperature rose at 4 p. m. from normal to 100.4°; no chill. Next day, 7 a. m., 103.4°; antipyrin, 5 grains, at 2 and 4 p. m.; also cold bath; liquid diet. On the 29th, 7 a. m., temperature 100.6°; 12 m., 101°; 4 p. m., 102.4°; one grain dose of antipyrin given. November 30, 7 a. m., temperature 100.2°; 12 m., 99.4°; 4 p. m., 100.6°. December 1, 7 a. m., 99.8°; 12 m., 102°; 4 p. m., 100.6°. December 2, 7 a. m., normal; 12 m., 99.8°; 4 p. m., 100.6°. December 3, 7 a. m., 102.2°; 12 m., 100.4°; 4 p. m., 102.4°; antipyrin, 5 grains, and one cold bath. December 4, 7 a. m., temperature 98°: 12 m., 98.6°; 4 p. m., normal, continuing so until he was discharged on December 12.

Case X.—Sergeant, Third Company, United States Volunteer Signal Corps, admitted 5 p. m., November 21, 1898, with temperature 105°, pulse 120, respiration 26. Had pneumonia several weeks before, which left him with a severe cough. Had a chill on the morning of admission, but none previously. At 6 p. m. temperature had risen to 105.4°, with nausea, vomiting, diarrhea, and severe headache. He received 5 grains of antipyrin at 6 and 7 p. m., and 10 grains of Dover's powder at 8 p. m., followed by one-hundredth of a grain digitalin. On the 22d at 7 p. m. the temperature was normal, at 12 m. 99°, and at 4 p. m. 101.4°; he received 5 grains of antipyrin. Next morning at 7 a. m. the temperature was 103°, which was reduced by a cold bath to 101.2°; at 12 m. 101.6°, and at 4 p. m. 101.2°. Antipyrin was repeated and the patient perspired very freely. On the 24th at 7 a. m. the temperature was 100°, remaining so till next day, when it rose to 102° at 2 p. m.; at 4 p. m. antipyrin, 5 grains, was given. November 26 and 27, temperature ranged between 100° and 100.6°, falling to 99° on the morning of the 28th. November 29 at 7 a. m., 99.4°; 12 m., 100°; 4 p. m. 99°. On the 30th the temperature was normal and continued so until his discharge, December 6. During his convalescence he was placed on small doses of strychnine and arsenic after meals.

Case XI.—Private Fifth United States Volunteer Infantry, admitted November 23, 1898, at 7 p. m., with a temperature of 102.6°. Two cold baths reduced the temperature to 100° by 11 p. m. November 24 at 7 a. m. the temperature was 99°; 12 m., 100°; 4 p. m., 103.8°. The bath was repeated and antipyrin administered; at 5 p. m. the temperature was 102°; on the 25th at 7 a. m., 101.2°; 12 m., 103.2°; 4 p. m., 105.2°. He received two cold baths at short intervals, followed by a cold pack, which reduced the temperature to 103°. On the 26th at 7 a. m. the temperature was 100°; 12 m., 98.6°; 4 p. m., 99°. November 27 and 28 the temperature ranged from 99.4° to 100°. On the 29th it became normal and continued so until he was discharged December 1.

Case XII.—Civilian employee, admitted November 23, 1898, at 4 p. m., with a temperature of 104°. Illness began with a continued fever five days before admission. A cold bath was prescribed and 5 grains of phenacetin administered, resulting in dropping the temperature at 7 p. m. to 100.4°. On the following morning the temperature was 101.4° at 7 a. m., 99.6° at 12 m., and 101.2° at 4 p. m. Phenacetin was repeated. November 25 at 7 a. m. temperature 100.2°, at 12 m. 99°, at 4 p. m. 100.4°. After November 26 the temperature continued normal and the patient was discharged December 9.

Case XIII.—Corporal Ninth United States Volunteer Infantry, admitted October 20, 1898, at 11 a. m., with a temperature of 104.8°. His health had always been good until a few days prior to his admission. A cold bath was given, the temperature being 103.2 at 4 p. m., and antipyrin was administered, which reduced the temperature to 102° at 7 p. m. To relieve constipation one-half grain calomel was given every hour until 2 grains were taken. On the 21st his temperature was normal until 4 p. m., when the thermometer registered 103.6°. Antipyrin was repeated at 4 p. m. and again at 5 p. m. At 7 p. m. the temperature was 103.4°. On the following day the temperature had again arisen to 103.8° at 7 a. m., at 12 m. to 104°, reaching its maximum at 4 p. m., 104.4°. He had received a cold bath at 12 m. and 2 p. m.; also 5 grains of antipyrin at 5 p. m. On the 24th the temperature was 101.4° at 7 a m., 102.2° at 12 m., 104.4° at 4 p. m. Two cold baths were given, reducing the temperature to 102° at 7 p. m. The following day the temperature remained normal. As the patient was somewhat constipated, calomel in divided doses was given with good result. On the 26th the temperature ranged from 99° at 7 a. m. and 100° at 12 m. to 104° at 4 p. m., falling somewhat after a cold bath. On the 27th the temperature was normal. On the morning of the 28th it had again risen, at 7 a. m., to 100°, dropping to 99.2° at 4 p. m. On the 29th it was 99° at 7 a. m., but remained normal during the entire day and until the 30th, when it rose to 101.6° at 7 a. m. At 12 m. it had dropped somewhat, to 100.6°, rising again to 102° at 4 p. m. On the 31st at 7 a. m. it was 100°, and continued so until November 2, 12 m., when it dropped to 99°. At 4 p. m. it was 99.2°. On November 3, 7 a. m., it was 102.6°; 12 m., 102°; 4 p. m., 100°. On the 4th it was normal, and continued so until 7 a. m. next day, when there was a chill, followed by a rise in temperature to 101°, gradually dropping to normal. November 6, temperature fluctuated between 98° and 99°. November 7, 100° at 7 a. m.; 12 m., 99°; 4 p. m., 99.4°. November 8 at 7 a. m. 98.4°; 12 m., 99.8°; 4 p. m., 99°. November 9, normal. November 10, 99.4°, at 4 p. m. On November 11 at 5 a. m. patient had a chill, followed by a temperature of 100° at 7 a. m. At 12 m. it was 99°; 4 p. m., 101.6°. From the 11th to the 21st the patient was entirely free from fever, but was taken again with a chill at 12 o'clock of the last-mentioned day, followed by a temperature of 101.6° at 2 p. m. At 4 p. m. it had dropped to 100°. He was given 5 grains of antipyrin. Now followed another intermission until December 1, when he overloaded his stomach and became very much constipated, the temperature rising to 102.2° at 7 a. m. and to 104° at 12 m. He was given an emetic and enema with very good results. Temperature, 99.4° at 7 p. m., without further medication. From this time until December 20 the patient was entirely free from fever. He was transferred to duty, fully recovered, on that day.

DIARRHEAL DISEASES.

The total number of recorded cases of diarrheal diseases in the Regular Army during the calendar year 1898 was 14,166, of which 100 were fatal. The cases consisted of—

	Cases.	Deaths.
Cholera morbus	55	....
Acute diarrhea	12,428	8
Chronic diarrhea	373	5
	12,856	13
Acute dysentery	1,150	67
Chronic dysentery	160	20
	1,310	87

The recorded cases of diarrhea and the fatalities among them are equivalent to an admission rate of 275.67 and a death rate of 0.10 per thousand of strength; those of dysentery to an admission rate of 28.09 and a death rate of 6.64. One man died in every 15 affected with dysentery; 1 in 989 of those affected with diarrhea or cholera morbus.

As a class, diarrheal diseases caused 303.76 admissions to sick report and 2.14 deaths per thousand of strength, 0.7 per cent of the cases being fatal. The admission rate was largest in the artillery arm, 398.24, and smallest in the Hospital Corps, 171.21. The large rate in the artillery has already been explained as the result of their having been stationed for the most part in permanent barracks, where record was made of trivial cases which in the field would have remained unnoted. The ratio of admissions in the infantry was 333.99 and of deaths 3.91 per thousand of strength. The ratio of deaths among the artillery men was only 0.42.

The white troops suffered relatively more from these diseases than the colored troops. Admission rates: White 312.72, colored 187.20, per thousand of strength, with 1 fatal case in 143 recorded cases among the white and 1 in 125 among the colored troops.

The admission rate in Puerto Rico was exceedingly high, 1,200 per thousand of strength, with a death rate of 2.07. This unusual prevalence was attributed to various causes, but chiefly to an excessive and indiscriminate use of fruits to which the men were unaccustomed. In Cuba the admission rate was small as compared with that of Puerto Rico, but the cases were mostly dysenteric and caused a death rate of 9.97 per thousand men, a rate larger than the death rate occasioned by typhoid fever, 9.74, in the Army as a whole during the year. In the Philippines the troops suffered from a somewhat increased prevalence attributed to the injudicious use of fruit, but the death rate, 1.72 per thousand of strength, shows that the percentage of dysenteric cases must have been small.

The distribution of diarrheal diseases throughout the year may be readily recognized from a tabulation of the monthly rates of admission:

January	2.14	July	32.70
February	1.38	August	54.36
March	1.77	September	47.69
April	7.19	October	27.82
May	32.23	November	17.74
June	18.57	December	17.86

The highest monthly mortality-rate was that for October, 0.80.

RHEUMATISM AND MYALGIA.

There were reported among the regular troops during the year 3,399 cases of rheumatism, as follows: Acute rheumatism, 328; chronic rheumatic arthritis, 274, and muscular rheumatism and myalgia, 2,797. Only one of these cases is reported as having been fatal, a case of rheumatic fever in the person of a colored soldier serving in the United States. The admission rate calculated from the reported cases was 72.88, and the rate of nonefficiency 2.73 per thousand of strength, as compared with the corresponding rates in 1897, 65.12 and 2.63. The mean annual rates of the decade 1887–1896 were 74.60 and 3.58. The colored troops, as in previous years, suffered considerably more from rheumatic affections than the white troops. During the present year the admission rate of the former was 132.21, of the latter 68.28, and in 1897 the corresponding rates were 100.74 and 61.80 per thousand men.

Of the various arms of the service, the infantry had the highest rate, 80.93; the rate of the Medical Department and Hospital Corps was only 47.62. Troops serving in the Philippines and in Puerto Rico had rates considerably higher than the mean rate, while in Cuba the rate was low—in the Philippines, 103.69; in Puerto Rico, 96.38, and in Cuba, 35.17.

The prevalence of these affections was at its minimum in June, the monthly rate of admission for that month being 2.38 per thousand of strength. The rates rose to a maximum of 8.94 in October and then fell gradually through the other months of the year. The minimum of rheumatic fever, 0.25, also occurred in June, but the maximum, 0.73 per thousand of strength, was recorded in January after a progressive rise from June to December.

DISEASES OF THE RESPIRATORY ORGANS.

Diseases of the respiratory organs formed only a small proportion of the total number of cases admitted to sick report during the past year. Nevertheless, the exposures of camp life had a marked effect in increasing the prevalence of these diseases and the mortality occasioned by them. The admission rate was 144.50, as compared with 77.74 in 1897, and the death rate 0.90, as compared with 0.22. The admission rate was highest, 203.76, and the death rate lowest, 0.63, in the artillery arm of the service. Both of these rates were lower in the islands than in the camps in the United States. In Cuba the admissions were 24.41 and the deaths 0.26 per thousand of strength, as compared with 161.27 and 1.05, the corresponding rates in this country. The months of least prevalence were May, June, and July, when the admission rates were, respectively, 5.02, 3.61, and 3.57; those of greatest prevalence were October, November, and December, with the respective rates 14.42, 21.34, and 32.08. The white troops suffered less from these diseases than the colored troops. Admission rates: White, 140.97; colored, 190.50. Death rates: White, 0.92; colored, 1.50.

Pneumonia caused nine-tenths of the deaths from diseases of the respiratory organs. A total of 226 cases, with 39 deaths, was reported, giving for the year an admission rate of 4.85 and a death rate of 0.84 per thousand of strength, as compared with 3.19 and 0.22 in the year 1897. The gravity of the cases was considerably increased during the last four months of the year. Of the whole number of cases treated during the year, 17.2 per cent died. During the civil war this percentage was 24.08 among the white and 32.44 among the colored troops.

ALCOHOLISM.

During the calendar year 1898, 707 cases of alcoholism were reported as having been under medical treatment in the Regular Army. Ten of the cases had a fatal ending.

	Cases.	Deaths.
Alcoholism, acute	637	6
Alcoholism, chronic	42	2
Delirium tremens	28	2

These cases gave for the year an admission rate of 15.16 per thousand of strength. This rate compares favorably with the rate in 1897, 27.86, and the mean annual rate of the previous decade, 36.90. These rates do not represent the amount of intemperance existing in the

Army or in any of its parts, but as they are all calculated from similar data, to wit, the number of cases in which medical assistance was invoked to avert danger, they are useful for purposes of comparison. The rates of admission in 1898 were highest during the first three months of the year when the troops were in garrison under conditions of peace. They were lowest during the period of active field service, May to August, inclusive. In Cuba drunkenness was measured by an annual admission rate of only 0.52 per thousand of strength, while in Puerto Rico a rate of 18.65 was associated with 2.07 deaths in every thousand men. In the Philippines the facility with which alcoholic liquors could be procured resulted in a rate of 21.70, but this rate was somewhat exceeded in the artillery arm of the service in garrison in the United States. During the past year, as in previous years, the colored troops had a lower rate, 4.81, than the white troops, 15.96.

VENEREAL DISEASES.

The total number of cases of these diseases reported was 3,727, consisting of syphilis, 470; chancroid and results, 831; gonorrhea, 2,165, and gonorrheal epididymitis and orchitis, 261. It is probable, however, that the prevalence of these diseases was greater than is represented by the recorded admissions. Many surgeons have reported that men belonging to commands camped or stationed in or near cities have sought medical treatment from civilian physicians to prevent the entry of venereal affections on their military record. But this does not render these records useless for purposes of comparison, as there are probably similar suppressions of cases in all statistics of this kind.

The venereal diseases above mentioned are equivalent to an annual admission rate of 79.92, while the nonefficiency occasioned by them is represented by 3.47 men constantly sick per thousand of strength. These rates compare favorably with those of the year 1897: Admissions 84.59, and nonefficiency 5.65. The mean annual rates for the decade 1887–1896 were 76.92 and 5.24. The mean annual rate of admission for the years of the civil war was 82 per thousand men present.

These diseases occurred with greater frequency among the colored troops than among the whites, the admissions being 119.29 per thousand of strength among the former and 76.90 among the latter, rates which differ but little from those of 1897. Of the arms of the service the artillery had the highest rates. The troops in the Philippines and in Puerto Rico had high rates of admission, 125.91 and 106.78, respectively, while the rate for the troops in the United States was 81.49 and for those in Cuba only 20.47. The distribution of these diseases throughout the months of the year was marked by a diminution of prevalence during the summer months and a considerable increase over the mean rate during the last three months of the year.

SPECIAL MEDICAL REPORTS.

The following special reports on medical subjects were received from medical officers from July 1, 1898, to June 30, 1899:

Name.	Rank.	Report.
Appel, D. M	Major and surgeon	Malaria.
Armstrong, S. T	Major and surgeon, volunteers.	Pernicious malarial fever; yellow fever.
Ashford, B. K	First lieutenant and assistant surgeon.	Ptomaine poisoning, 12 cases.
Baird, W. T	Acting assistant surgeon	Aestivo-autumnal fever at Fort Bliss, Tex.
Birmingham, H. P	Major and surgeon	Varicose veins.
Brown, H. H	Acting assistant surgeon	Typhoid fever, thermograph.
Carr, L. C	Major and surgeon, volunteers.	Quinine in fevers known as calentura; acute catarrhal gastritis.

Special reports on medical subjects, etc.—Continued.

Name.	Rank.	Report.
Condon, L. C	Acting assistant surgeon	Ptomaine poisoning; gangrenous varicella.
Cook, George	Major and surgeon, volunteers.	Typhoid fever.
Cox, Walter	First lieutenant and assistant surgeon.	Cerebro-spinal meningitis.
Eppler, Crum	Major and surgeon, volunteers.	Yellow fever.
Fabricus, F. W	Acting assistant surgeon.	Malarious disease in Santiago province.
Flagg, C. E. B.	Captain and assistant surgeon.	Malarial fever, 2 cases; pemphigus.
Fletcher, R. M.	Acting assistant surgeon.	Variola.
Gibson, John T.	Major and surgeon, volunteers.	Aestivo-autumnal malarial fever.
Girard, J. B.	Major and surgeon	Acute mania.
Harvey, P. F	do	Typhoid fever at Fort Snelling.
Howard, D. C.	Captain and assistant surgeon.	Typhoid and malarial fever.
Ireland, M. M.	do	Cerebro-spinal meningitis.
Kulp, John S	do	Malarial fever at Fort Niagara, N. Y.; 43 cases of subcutaneous vaccination.
Laine, D. T	Acting assistant surgeon.	Glanders in the city of Havana.
Lynch, Charles	Captain and assistant surgeon.	Yellow fever (?) at Fort Point, Tex.
Miller, J. E	Acting assistant surgeon.	Cerebro-spinal meningitis.
O'Reilly, R. M	Lieutenant-colonel, volunteers, chief surgeon.	Yellow fever in division of Cuba.
Plummer, G. R	Acting assistant surgeon	Scarlet fever.
Roberts, D. M.	do	Variola and varioloid.
Salleby, Najeeb M.	do	Typhoid fever.
Skinner, George	First lieutenant and assistant surgeon.	Phthisis.
Smith, Bat	Acting assistant surgeon	Malarial hæmaturia; 5 cases.
Smith, Louis P	First lieutenant and assistant surgeon.	Smallpox at Fort D. A. Russell.
Strong, R. H	do	Cerebro-spinal meningitis.
Ten Eyck, B. L	Captain and assistant surgeon.	Do.
Tesson, L. S	Major and surgeon	Malaria at Fort Ethan Allen, Vt.; cerebro-spinal meningitis.
Tilton, H. R	Lieutenant-colonel and deputy surgeon-general.	Indian battle, Leech Lake, Minn.
Wakeman, W. J	Major and surgeon	Variola.
Wells, G. M	Captain and assistant surgeon.	Do.
Winne, C. K.	Major and surgeon	Typhoid fever; cerebro-spinal meningitis.
Woodson, R. S	Captain and assistant surgeon.	Smallpox at Holguin, Cuba.

INJURIES.

The total number of injuries incurred by the troops of the Regular Army during the calendar year 1898 amounted to 9,758, as follows:

	Admissions.	Discharges.	Deaths.
General injuries	712	5	60
Abrasions, burns, and scalds	741		
Injuries to brain and spine	40		4
Contusions and sprains	4,465	13	1
Dislocations	95	1	
Fractures, exclusive of gunshot	284	13	4
Hernia, inguinal	233	53	1
Wounds:			
Not gunshot	1,493	4	5
Gunshot	1,457	96	184
Other injuries	238	10	
Total	9,758	195	259

The rate of admission for these injuries, 209.23 per thousand of strength, is smaller than the rate 290.08 in the year 1897. The singularity of the fact that the injuries recorded in a year of peace were relatively more numerous than those recorded in a year of war has already been noted on page 236, where the probable cause of this unexpected statistical result is suggested.

The death rate occasioned by injuries in the Army was 5.55 per thousand of strength, as compared with 1.97 in 1897. It was larger in the infantry, 7.29, and in the cavalry, 6.47, than in the artillery, 3.55. In the Engineer Corps this rate was 8.40 and in the ordnance 5.95. The wounds of battle gave the troops operating in Cuba the high rate of 37.01 per thousand of strength, this rate constituting nearly two-fifths of the death rate from all causes in that island. The rate in Puerto Rico was only 2.07, and in the Philippines 4.13.

The rate of discharge for injury was 4.18 as compared with 2.01 in 1897. This rate was highest in the infantry, 6.19. In the other corps and arms of the service it was below the rate of the Army as a whole. The discharges were effected chiefly in the United States.

Among the general injuries recorded there were 308 cases of exhaustion from fatigue or exposure, with 7 deaths and 1 discharge; 249 cases of insolation, with 8 deaths and 3 discharges; 10 cases of lightning stroke, with 3 deaths, and 22 deaths from drowning, 3 of which were suicidal.

In the list of injuries given above the wounds other than gunshot comprised 255 contused wounds, 499 incised wounds, 509 lacerated wounds, and 230 punctured wounds.

No less than 233 cases of hernia were reported during the year, or 5 cases in every thousand men. In 1897 hernial cases numbered 84, equivalent to 3.30 per thousand, and the average annual number during the decade 1887–1896 was 63, equivalent to a rate of 2.56. Active service during a year of war may therefore be said to have doubled the relative number of ruptures in the Army.

The following cases additional to those published in previous annual reports from this office have been operated on for the radical cure of hernia. This list includes the cases of 41 regular soldiers, 26 volunteer soldiers, and 1 civilian.

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
H. H	Private, A, 4th Infantry		Right inguinal	Mar. 28, 1899	Maj. Geo. W. Adai surgeon, U. S. A.
C. R. N	Private, F, 5th Artillery	23	Left inguinal (2 months).	Jan. 5, 1898	Maj. A. H. Appel surgeon, U. S. A
H. L. H	Cadet, U. S. M. A		Left inguinal	Dec. 5, 1899	Maj. J. M. Baniste surgeon, U. S. A.
H. G. J	do		Right inguinal	Jan. 19, 1899	
J. W. B	Private, B, 9th Infantry		do	Jan. 23, 1899	
J. K	Private, Hospital Corps		do	Mar. 13, 1899	
F. W. C	Private, E, Engineers		Left inguinal	Apr. 10, 1899	
S. A. C	Second lieutenant, Engineers.		do	May 6, 1899	
C. F. C	Cadet, U. S. M. A		do	May 13, 1899	
E. L. C	G, 7th Infantry		Right inguinal	July 17, 1898	Capt. W. C. Borde assistant surgeon, U. S. A.
W. L. M	D, 2d Artillery	27	Left inguinal (3 months).	Nov. 27, 1898	
T. C. D	F, 1st Volunteer Engineers.	38	do	Dec. 2, 1898	
J. B	1st South Carolina Heavy Artillery.	21	Right inguinal	Dec. 3, 1898	
H. O	K, 8th Infantry	22	Right inguinal (3 months).	Dec. 12, 1898	
F. H	M, 16th Infantry	35	Right inguinal (2 months).	Dec. 17, 1898	
J. F. M	F, 16th Infantry	26	Right inguinal (7 months).	Jan. 9, 1899	
C. N	E, 11th Infantry	22	Double inguinal (7 months).	Jan. 15, 1899	
N. B. P	Band, 2d Cavalry	28	Left inguinal (4 months).	do	
W. E. R	K, 1st Rhode Island Volunteers.	21	Left inguinal (7 months).	Feb. 2, 1899	
C. F. G	F, 1st Rhode Island Volunteers.	33	Right inguinal	Feb. 3, 1899	
P. A	I, 203d New York Volunteers.	29	Double inguinal (1 month).	Feb. 4, 1899	
C. F	D, 3d Cavalry	20	Left inguinal (7 months).	Feb. 10, 1899	

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
P.D	Commissary-sergeant, U. S. A.	35	Left inguinal	Feb. 14, 1899	Capt. W. C. Borden, assistant surgeon, U. S. A.
H.G	Lieutenant, 4th Ohio Volunteers.	25	Left inguinal (4 months).	do	
W.L	F, 2d Cavalry	17	Right inguinal (recurrent).	Feb. 17, 1899	
F.M.W	D, 9th Infantry	17	Left inguinal (7 months).	do	
J.C.L	C, 203d New York Volunteers.	27	Right inguinal (4 months).	Feb. 21, 1899	
W.B.P	K, 2d Cavalry	28	Right inguinal (6 months).	do	
P.M	K, 5th Artillery	23	Left inguinal (7 months).	Feb. 24, 1899	
J.J.S	Hospital Corps	24	Right inguinal (8 months).	Feb. 27, 1899	
J.E.B	do	18	Right inguinal (7 months).	Mar. 10, 1899	
W.M.P	C, 201st New York Volunteers.	42	Right inguinal (2 months).	Mar. 21, 1899	
L.F.W	Hospital Corps	26	Left inguinal (7 months).	Mar. 28, 1899	
C.W.B	do	24	Ventral	Apr. 4, 1899	
O.E.F	O, 7th Artillery	22	Left inguinal	Apr. 22, 1899	
J.H.W	C, 15th Infantry	36	Right inguinal	do	
C.S.R	Major, 17th Infantry	57	Double inguinal	Apr. 25, 1899	
W.W.J	M, 4th Artillery	26	Left inguinal	May 2, 1899	
A.H	Civilian	21	Left inguinal (5 years).	May 23, 1899	
C.P.H	Major, 8th Cavalry	48	Right inguinal	June 29, 1899	Maj. L. C. Carr, surgeon, U. S. V.
J.F.L	Private, C, 2d Volunteer Infantry.		Left inguinal (4 years).	Mar. 5, 1899	
J.A.H	Private, Hospital Corps.		Ventral	Mar. 15, 1899	
H.M.W	Private, G, 2d Volunteer Infantry.		Right inguinal (congenital).	Mar. 17, 1899	
G.W	Private, B, 4th Volunteer Infantry.		Left inguinal (14 months).	do	
R.L.E	Corporal, B, 9th Volunteer Infantry.		Double inguinal (14 months).	do	
J.A	Private, D, 23d Kansas Volunteer Infantry.		Incomplete	Mar. 20, 1899	
W.H.C	Corporal, F, 2d Volunteer Infantry.		Right inguinal	do	
F.E	Private, C, 2d Volunteer Infantry.		do	Mar. 27, 1899	
W.F.L	Private, F, 2d Volunteer Infantry.		Right inguinal (15 months).	Mar. 28, 1899	
J.H.H	Private, A, 23d Kansas Infantry.		Double inguinal (19 months).	do	
J.C.M	Private, 8th California Infantry.		Left inguinal	Sept. 25, 1898	Maj. F. W. Dudley, surgeon, 8th California Infantry.
A.E.T	Private, L, 8th California Infantry.	19	Right inguinal	Nov. 22, 1898	
G.S	Private, M, 3d Artillery.		Left inguinal	Apr. 12, 1899	Maj. R. G. Ebert, surgeon, U. S. A.
F.C.M	Private, I, 1st North Dakota Infantry.		Right inguinal (2 months).	Mar. 3, 1899	Capt. Guy L. Edie, assistant surgeon, U. S. A.
J.D	Sergeant, H, 16th Infantry.	47	Left inguinal (1 month).	Oct. 30, 1898	Col. W. H. Forwood, Assistant Surgeon-General, U. S. A.
T.H.L	Private, E, 16th Infantry	22	Left inguinal (2 months).	do	
F.H	Corporal, D, 16th Infantry.	25	Right inguinal	Mar. 25, 1899	Capt. Charles Lynch, assistant surgeon, U. S. A.
R.J.H	Private, N, 2d Louisiana Infantry.		do	Mar. 14, 1899	Maj. J. R. McDill, surgeon, U. S. V.
J.B.C	Private, L, 1st Texas Infantry.	23	Right inguinal (6 months).	do	
C.M	Private, 2d Artillery	35	Left inguinal	do	
W.D.F	Private, C, 21st Kansas Infantry.	22	Left inguinal (6 months).	Dec. 6, 1898	Maj. George H. Torney, surgeon, U. S. A.
J.B.C	do	19	Right inguinal (5 months).	Dec. 8, 1898	
G.Q.S	Private, Hospital Corps.	23	Left inguinal (7 months).	Jan. 19, 1899	
R.N	Private, K, 1st Cavalry	21	Right inguinal (8 months).	Mar. 23, 1899	
J.M	Private, I, 8th Cavalry		Left inguinal	June 20, 1899	Maj. L. M. Maus, surgeon, U. S. A.
L.H	Private, B, 20th Infantry.		Right inguinal (recent).	Nov. 19, 1898	W. R. Van Tuyl, acting assistant surgeon, U. S. A.
I.R.C	Private, L, 21st Kansas Infantry.		do	Dec. 6, 1898	
E.E.S	Private, D, 21st Kansas Infantry.	21	Left inguinal (6 months).	Jan. 11, 1899	

GUNSHOT WOUNDS.

During the calendar year 1898, 1,457 gunshot wounds were reported as having been incurred by the soldiers of the Regular Army. Of these wounds 1,320 appear on the medical reports and registers as casualties of battle, while 137 are recorded as resulting from accident, quarrels, attempted suicide, etc.

Of the 1,320 gunshot wounds received in battle, 1,221 are said to have been caused by bullets, 83 by shell, and 16 by shrapnel. The bullets are specified as Mauser in 229 of the cases and in two as explosive, the latter statement probably made on no other evidence than the character of the wounds.

In 57 of these battle injuries the site and extent of the wound are not stated. Flesh wounds in various parts of the body number 860, constituting 68.1 per cent of the total number in which the site of the wound is specified. There are recorded 85 penetrating wounds of the thorax or abdomen; 41 fractures of the cranial or facial bones, and 7 of the spine; 140 of the upper extremity, 86 of these being fractures of the metacarpus or fingers; 130 of the lower extremity, the shaft of the femur being involved in 26, the kneejoint in 17, the leg and ankle in 34, and the metatarsus and toes in 53. But the character and distribution of these battle wounds will be understood better from the following tabular statement than from any lengthened description:

Gunshot wounds received in battle.

REGULARS, UNITED STATES ARMY, 1898.

Character and location of wounds.	Missile.			Shrapnel.	Total.
	Bullet.	Mauser.	Shell.		
HEAD.					
Head:					
Flesh wounds	27	3	10	......	40
Fracture	24	5	1	......	30
Face:					
Flesh wounds	26	7	9	......	42
Fracture	10	1	......	1	12
TRUNK.					
Spine, fracture	4	1	1	1	7
Neck, flesh wounds	28	4	1	1	34
Thorax:					
Nonpenetrating	39	11	7	2	59
Penetrating	39	12	......	......	51
Abdomen:					
Nonpenetrating	18	......	1	......	19
Penetrating	25	7	1	2	35
Back and hips, flesh wounds	72	20	7	2	101
Perineum and genital organs	3	1	1	......	5
UPPER EXTREMITIES.					
Shoulder:					
Flesh wounds	67	16	7	......	90
Joint	3	......	......	......	3
Arm:					
Flesh wounds	69	15	2	1	87
Fracture	13	5	......	......	18
Elbow joint	3	2	......	......	5
Forearm:					
Flesh wounds	39	9	4	......	52
Fracture	15	8	......	......	23
Wrist joint	5	......	......	......	5
Metacarpus	41	4	4	1	50
Fingers	26	6	4	......	36
LOWER EXTREMITIES.					
Hip joint	......	......	......	......	......
Thigh:					
Flesh wounds	108	44	8	3	163
Fracture upper third	7	3	......	1	11
Fracture middle third	4	1	......	......	5
Fracture lower third	8	2	......	......	10

Gunshot wounds received in battle—Continued.

REGULARS, UNITED STATES ARMY, 1898—Continued.

Character and location of wounds.	Missile.			Shrapnel.	Total.
	Bullet.	Mauser.	Shell.		
LOWER EXTREMITIES—continued.					
Kneejoint	15	1	1		17
Leg:					
Flesh wounds	94	24	9	1	128
Fracture	16	6	2		24
Ankle joint	9	1			10
Metatarsus	27	3	1		31
Toes	20	1	1		22
Foot, plantar flesh wounds	31	6	1		38
Unknown	57				57
Total	992	229	83	16	1,320

Of the 137 gunshot wounds received otherwise than in conflict with the enemy, 81 are reported as having been incurred in the line of duty and 56 as not in the line of duty. The hand was the seat of injury in 30 of the accidental line-of-duty cases.

Besides the deaths supervening in the cases treated in hospital, 106 deaths were reported by medical officers as having occurred among men who were not on sick report at the time of their death. These included 86 killed in action and 20 cases in which the killing was accidental, homicidal, or suicidal. Many men were killed in battle whose names do not appear in the field hospital registers, because the medical officers had no information concerning them. Surgeons are not called upon to report the killed in an engagement with an enemy. This is the duty of commanding officers. Surgeons, under Army Regulations, 1466, report the wounded to the Surgeon-General, and in doing this they usually add to their lists the names of all who have died while being carried from the field or whose bodies have been brought to the hospital for burial.

Of the 86 men killed in action, death was due to gunshot injury of the head in 26 cases, to penetration of the abdomen in 19, to penetration of the chest in 17, and in 1 each to injury of the thigh and leg, while in 22 cases the site of the fatal wound was not stated. Of the 20 killed otherwise than in battle, 12 were shot in the head, 3 in the thorax, 1 in the abdomen, while in 4 no statement was entered concerning the site of the gunshot injury.

The table submitted below shows the site and character of the 1,457 gunshot wounds incurred during the year and indicates the manner in which the completed cases were terminated. One hundred and eleven cases remained under treatment December 31, 1898; 1,071 were returned to duty during the year; 97 died; 115 were discharged on certificates of disability, and 63 were disposed of in other ways.

Of the 97 deaths, 1 was the result of yellow fever, 5 of typhoid fever, 2 of malarial fever, and 1 drowning.

Of the 63 cases reported as disposed of otherwise than by return to duty, discharge for disability, or by death, 28 were discharged by expiration of term of service and 10 by order, 2 were dropped as missing, 3 were retired, 1 deserted, and 19 were reported as "not found." It is supposed that those reported as not found are cases of volunteer soldiers taken up erroneously as belonging to the Regular Army, owing probably to the omission of the name of the State after the number of the regiment. They will probably be found when the medical records of the volunteer troops have been carded.

Of the 111 cases remaining on sick report December 31, 1898, 37 have been returned to duty, 53 discharged on certificates of disability, 7 discharged by expiration of term of service, 9 discharged by order, 1 died, and 4 were still remaining on sick report at the date of the last reports received.

Gunshot wounds (from all causes), showing missile and disposition.

MISSILE.

Character and location.	Bullet.	Mauser.	Shell.	Shrapnel.	Small shot.	Cartridge shell.	Ramrod of cannon.	Total.
HEAD.								
Head:								
Flesh wound	27	3	10					40
Fracture	25	5	1					31
Face:								
Flesh wound	26	7	9		1			43
Fracture	14	1		1				16
TRUNK.								
Spine, fracture	5	1	1	1				8
Neck, flesh wounds	29	4	1	1				35
Thorax:								
Nonpenetrating	41	11	7	2				61
Penetrating	41	12						53
Abdomen:								
Nonpenetrating	19		1					20
Penetrating	34	7	1	2				44
Back and hips, flesh wound	77	20	7	2	2			108
Perineum and genital organs	5	1	1					7
UPPER EXTREMITIES.								
Shoulder:								
Flesh wound	70	16	7		2			95
Joint	3							3
Arm:								
Flesh wound	77	15	2	1	1			96
Fracture	13	5						18
Elbow joint	3	2						5
Forearm:								
Flesh wound	42	9	4					55
Fracture	17	8					1	26
Wrist joint	6							6
Metacarpus	60	4	4	1		1		70
Fingers	40	7	4		4			55
LOWER EXTREMITIES.								
Hip joint								
Thigh:								
Flesh wound	118	44	8	3	2	1		176
Fracture upper third	8	3		1				12
Fracture middle third	4	1						5
Fracture lower third	11	2						13
Kneejoint	16	1	1					18
Leg:								
Flesh wound	100	24	9	1	2			136
Fracture	17	6	2			1		26
Ankle joint	10	1						11
Metatarsus	33	3	1					37
Toes	24	1	1					26
Foot plantar, flesh wound	37	6	1					44
UNKNOWN	58							58
Total	1,110	230	83	16	14	3	1	1,457

Gunshot wounds (from all causes), showing missile and disposition—Continued.

DISPOSITION.

Character and location	Duty.	Certificate of disability.	Died.	Discharg'd by order.	Expiration of term of service.	Not found.	Remaining Dec. 31.	Disposition in 1899.
HEAD.								
Head:								
Flesh wound	36	....	....	....	....	2	2	2 discharged by order.
Fracture	6	3	18	....	1	....	3	2 discharged on certificate of disability. 1 remaining; October, 1899.
Face:								
Flesh wound	33	4	2	1	....	1	2	2 discharged by order.
Fracture	11	2	2	....	....	....	1	1 returned to duty.
TRUNK.								
Spine, fracture	....	....	[1]6	....	....	....	[2]2	[1]1 Death from yellow fever. [2]2 discharged on certificate of disability.
Neck, flesh wound	24	1	7	....	....	2	1	1 remaining October 31, 1899.
Thorax:								
Nonpenetrating.	51	1	....	2	1	2	4	3 discharged by expiration of service and 1 by order.
Penetrating	27	7	13	....	....	....	6	3 discharged on certificate of disability and 3 returned to duty.
Abdomen:								
Nonpenetrating.	17	....	[1]1	....	....	....	[2]2	[1]Died of malarial fever. [2]2 discharged on certificate of disability.
Penetrating	6	3	29	[1]1	1	....	[2]4	[1]Dropped as missing. [2]1 died, 1 returned to duty, and 2 discharged on certificate of disability.
Back and hips, flesh wound.	87	5	2	[1]2	5	....	[2]7	[1]1 deserted and 1 discharged by order. [2]2 discharged on certificate of disability; 5 returned to duty.
Perineum and genital organs.	7	....	....	....	....	....	....	
UPPER EXTREMITIES.								
Shoulder:								
Flesh wound	80	6	....	1	[1]1	....	[2]7	[1]1 retired. [2]3 discharged on certificate of disability and 2 by order; 2 returned to duty.
Joint	1	2	....	....	....	....	....	
Arm:								
Flesh wound	82	8	....	....	1	....	5	2 discharged on certificate of disability, 1 by order, and 1 by expiration of service; 1 returned to duty.
Fracture	11	5	1	....	[1]1	....	....	[1]1 Retired.
Elbow joint	2	1	....	....	....	....	2	1 discharged on certificate of disability and 1 returned to duty.
Forearm:								
Flesh wound	45	4	[1]1	1	....	1	[2]3	[1]Died of typhoid fever. [2]2 discharged on certificate of disability and 1 returned to duty.
Fracture	14	8	....	....	....	....	4	4 discharged on certificate of disability.
Wrist joint	5	1	....	....	....	....	....	
Metacarpus	47	14	[1]1	....	2	1	[2]5	[1]Died of typhoid fever. [2]2 discharged on certificate of disability; 3 returned to duty.
Fingers	39	5	[1]1	2	2	....	[2]6	[1]Found drowned at Fort Monroe, Va. [2]4 discharged on certificate of disability; 2 returned to duty.

Gunshot wounds (from all causes), showing missile and disposition—Continued.

DISPOSITION—Continued.

Character and location.	Duty.	Certificate of disability.	Died.	Discharg'd by order.	Expiration of term of service.	Not found.	Remaining Dec. 31.	Disposition in 1899.
LOWER EXTREMITIES.								
Hip joint	......	......	......	......	......	......	......	
Thigh:								
Flesh wound	141	10	[1]3	[2]1	[3]6	......	[4]15	[1] 1 death from typhoid fever. [2] 1 retired. [3] 1 missing. [4] 10 discharged on certificate of disability; 5 returned to duty.
Fracture upper third.	2	4	2	......	......	......	4	3 discharged on certificate of disability; 1 remaining October, 1899.
Fracture middle third.	3	1	1	......	......	......	......	
Fracture lower third.	3	3	1	......	1	......	5	2 discharged on certificate of disability; 3 returned to duty.
Kneejoint	14	2	1	......	......	......	1	Discharged on certificate of disability.
Leg:								
Flesh wound	120	5	[1]2	......	4	2	[2]3	[1] 1 death from typhoid fever. [2] 1 discharged on certificate of disability; 2 returned to duty.
Fracture	17	4	......	1	2	1	1	Discharged on certificate of disability.
Ankle joint	7	3	......	......	......	......	1	Discharged on certificate of disability.
Metatarsus	23	2	......	......	1	1	10	3 discharged on certificate of disability and 1 by expiration of service; 5 returned to duty, and 1 remaining September, 1899.
Toes	21	......	[1]1	1	1	1	[2]1	[1] Died from malarial fever. [2] Returned to duty.
Foot plantar, flesh wound.	36	1	[1]1	......	1	1	[2]4	[1] Died from typhoid fever. [2] 1 discharged on certificate of disability, 1 by order, and 1 by expiration of service; 1 returned to duty.
UNKNOWN	53	......	1	......	......	4	......	
Total	1,071	115	97	13	31	19	111	

Eighteen cases proved fatal out of 31 gunshot fractures of the cranium, a percentage of 58.1 (which, however, was exceeded by that of penetrating wounds of the abdomen). Six were returned to duty, 5 were discharged on certificates of disability, and 1 by expiration of term of service. One still remains on sick report as under treatment at the Eye, Ear, and Throat Hospital, New York City. Surgical operations were reported in five cases. In one, a bullet was removed, the patient ultimately being returned to duty; in one, fragments of bone were removed, but the issue in this case was fatal; in three, trephining was performed, resulting in one death and two discharges for disability.

Of 2 deaths from wounds reported as flesh wounds of the face, the determining cause in one is said to have been septicæmia, and in the other inflammation of the brain. One flesh wound of the face is said to have resulted in total blindness.

Of 16 fractures of the bones of the face 2 resulted fatally, one from septicæmia and the other from inflammation of the brain. The operative surgery in these fractures consisted of the removal of four bullets from the tissues.

Eight gunshot fractures of the spine were reported, 6 fatal, but yellow fever was the cause of death in one instance. The patients in two cases were discharged for disability subsequent to December 31, 1898.

Of 35 gunshot wounds of the neck, 7 were fatal. In two of the fatal cases operative proceedings were undertaken for subclavian aneurism. The patient in one case was received July 17, 1898, into the Long Island College Hospital. "Fracture of clavicle; aneurism of the subclavian; operated on September 2 by Drs. Delateur and Campbell; died two hours after the operation." In the other case the patient arrived at the general hospital, Fort Monroe, Va., July 13, and was operated on July 20. "Died while undergoing operation, from hemorrhage." One case remains on sick report to the present time, but in it the X-ray shows the body of the fifth cervical vertebra to have been injured.

No fatality occurred among the 61 cases of nonpenetrating wounds of the thorax.

Fifty-three penetrating wounds of the thorax were recorded. Thirty of these were returned to duty, 10 were discharged on certificates of disability, and 13 died, a mortality of 24.5 per cent. In one of the cases death resulted from cerebral hemorrhage. A bullet was removed in one case, which was disposed of by discharge for disability. In one case thoracentesis was performed, and in another resection of ribs to drain the pleural cavity; both patients were returned to duty.

Of 20 nonpenetrating wounds of the abdomen none was fatal, the death recorded in the table having been due to malarial fever. Of 44 penetrating wounds 30 died and 1 was dropped as missing; 5 were discharged on certificates of disability. The rate of mortality among these cases was 68.2 per cent. Surgical intervention is mentioned in only four of these cases. The bullet was removed in two cases, one fatal; in one, laparotomy was performed with a fatal result, and in one a wound in the colon was closed, the patient dying of septic peritonitis, January 23, 1899. The immediate cause of death is stated in four cases—in one septicæmia, in one septic peritonitis, in one acute peritonitis, and in one internal hemorrhage, October 11, 1898, from a wound received July 1, 1898.

The muscles of the back and hips were wounded in 108 cases; 6 of these were discharged on certificates of disability and 2 died; one, wounded July 1, 1898, died at Siboney, Cuba, on the 13th, the other, wounded July 1, died at the United States Marine Hospital, New York City, on the 10th. The surgical work reported consisted of the removal of four bullets.

Of 95 flesh wounds of the shoulder the patients in 9 cases were discharged and in 1 case retired for disability. No case proved fatal, nor did any fatality occur among 96 flesh wounds of the arm. Ten of these cases, however, were discharged for disability; in one the disability is specified as due to chronic neuritis and partial paralysis. Of 55 flesh wounds of the forearm 1 died, but the death was due to typhoid fever. The surgical work in all these cases consisted merely in the removal of five bullets and one piece of shell.

The shoulder joint was injured in 3 cases, ending in return to duty in 1 case and in discharge for disability in 2 cases. The elbow was injured in 5 cases, resulting in return to duty in 3 cases and in discharge for disability in 2 cases. The wrist joint was injured in 6 cases, ending in return to duty in 5 cases and discharge for disability in 1 case. The removal of 1 bullet was the only surgical intervention reported in these joint injuries.

Of 18 gunshot fractures of the arm 11 ended in return to duty, 6 in discharge or retirement. One resection and 4 amputations were performed; one of the latter done at a dressing station, July 1, 1898, died at Fort McPherson, Ga., July 19.

Of 26 fractures of the forearm, 14 were returned to duty and 12 discharged for disability. Amputation was performed in 2 cases, resection in 1; fragments of bone were removed in 1, and bullets extracted in 3 cases.

Twenty-six wounds of the hand resulted in discharge for disability out of 125 recorded cases. The patients in 2 of these cases died, 1 of typhoid fever, the other by drowning. Two amputations of metacarpal bones and 11 of fingers and 3 bullets extracted constituted the operative surgery reported.

Three deaths occurred among 176 men wounded in the thigh. Two of these died within forty-eight hours after the receipt of their injuries, both thighs being perforated in each case. The death in the third case resulted from typhoid fever. Twenty-one were discharged or retired for disability. One amputation was performed for gangrene; the patient recovered. The removal of 9 bullets is also reported.

Of 136 flesh wounds of the leg 6 were discharged for disability. Two soldiers thus wounded died, one from malarial fever and heat exhaustion, the other probably from hemorrhage shortly after the receipt of his wound, August 13, 1898, at Manila. The removal of 2 bullets is the only surgical work reported.

The hip joint appears to have escaped injury among the regular troops during the year, but there were 12 gunshot fractures of the upper third of the femur. Two of these cases ended fatally after amputation at the hip joint, 2 were returned to duty, 7 were discharged for disability, and 1 continues on the sick list at the present time. In 5 fractures in the middle third amputation was performed in 2, one of which ended fatally by septicæmia. In 13 fractures of the lower third amputation was performed in 2 cases, one of which proved fatal; resection of bone in 1 case, which ended in discharge for disability. Six of the 13 cases were returned to duty.

Of 18 injuries to the kneejoint 14 ended in return to duty, 3 in discharge, and 1 in death. Amputation was performed in the case which ended fatally. A bullet was extracted in one of those discharged for disability.

Of 26 gunshot fractures of the leg 5 were discharged on certificates of disability. Amputation in 1 case, the removal of a bullet in 1 case, of diseased bone in another, and of fragments of bone in 2 cases constituted the operative surgery reported.

Seven fractures of the ankle joint were returned to duty and 4 were discharged for disability out of 11 cases reported. Amputation was performed in 1 of these fractures.

One hundred and seven gunshot injuries of the foot were reported. Seven of these cases were discharged on certificates of disability. The 2 deaths tabulated were due to disease—malarial fever in 1 case, typhoid fever in the other.

SPECIAL SURGICAL REPORTS.

Comparatively few surgical cases were made the subject of special reports by medical officers during the past year. All had enough to occupy them in overcoming the difficulties of caring for their sick and wounded and in making the necessary official records. As a rule they had no time to devote to the careful literary presentation of individual cases.

The following list comprises the reports rendered during the fiscal year ended June 30, 1899:

Name.	Rank.	Report.
Adair, George W	Major and surgeon	Operation for radical cure of hernia.
Appel, A. H	do	Do.
Appel, D. M	do	Photographs of trolley car arranged for sick and wounded.
Banister, J. M	do	Operation for radical cure of hernia, 12 cases.
Banister, W. B.	Captain and assistant surgeon.	Amputation of leg. (See infra, p. 326.)
Borden, W. C	do	Operation for radical cure of hernia, 40 cases; report of surgical orerations for year ending June 30, 1899. (See infra, p. 317.)
Boyd, W. J	Acting assistant surgeon	Excision of inguinal glands.
Carr, L. C	Major and surgeon of volunteers.	Amputation of arm (see infra, p. 327); noma on face; gunshot wound of abdomen; splenic abscess (see infra, p. 323); fæcal impaction; surgical operations during March, 1899. (See infra, p. 318.)
Cloud, M. M	First lieutenant and assistant surgeon.	Pelvic deformity; forceps delivery.
Cowper, Harold W	Acting assistant surgeon	Fracture of fifth cervical vertebra. (See infra, page 321.)
Devine, W. H	Major and surgeon of volunteers.	Poisoning by wood alcohol; surgical cases at Camp Alger, Va. (See infra, page 316.)
De Witt, Calvin	Major and surgeon	History of wounds, with photographs.
Dudley, F. W	Major and surgeon of volunteers.	Operation for radical cure of hernia (2 reports); ligation of common carotid.
Ebert, R. G	Major and surgeon	Operation for radical cure of hernia.
Edie, Guy L	Captain and assistant surgeon.	Surgical operations, 4 cases.
Flagg, C. E. B	do	Gunshot wound of abdomen (2 reports); appendicitis, 2 cases.
Forwood, W. H	Colonel and assistant surgeon-general.	Surgical operations, year ending June 30, 1898; hernia operations, year ending June 30, 1898.
Gardner, E. F	Major and surgeon	Gunshot wound of chest.
Greenleaf, Henry S	First lieutenant and assistant surgeon.	Chest wounds during Spanish-American war.
Hallock, H. M	Captain and assistant surgeon.	Appendicitis.
Jackson, T. W	Acting assistant surgeon	Laparotomy for typhoid perforation. (See supra page 285.)
Kimball, J. P	Major and surgeon	Pyopneumothorax. (See infra page 321.)
Kittrell, B. H	Acting assistant surgeon	Operations for radical cure of hernia (3 reports); nephritic abscess.
Lynch, Charles	Captain and assistant surgeon.	Appendicitis (2 cases); operation for radical cure of hernia.
Mason, Charles F	do	Gunshot wound of cranium, suicide.
McCaw, W. D	do	Punctured wound of shoulder and over heart.
Miller, James E	Acting assistant surgeon	Otitis media, opening of mastoid antrum. (See infra page 320.)
Morris, John E	Acting assistant surgeon	Attempted suicide.
Phelan, H. D	do	Fracture of skull. (See infra, page 318.)
Pope, B. F	Lieutenant-colonel and deputy surgeon-general.	Fracture of cervical vertebra.
Robinson, E. F	Acting assistant surgeon	Rupture of bladder.
Saleeby, Najeeb M	do	Laparotomy for typhoid perforation. (See supra, page 283.)
Schreiner, E. R	First-lieutenant and assistant surgeon.	Appendicitis.
Stone, J. H	do	Gunshot fracture, fourth cervical vertebra. (See infra, page 320.)
Torney, George H	Major and surgeon	Operation for radical cure of hernia; 5 cases.
Van Tuyl, W. R	Acting assistant surgeon	Operation for radical cure of hernia, 2 reports; appendicitis.

Many of the above reports relate to surgical work on the soldiers of the Volunteer Army, and the cases are therefore not included in the statistics and tabulations of injuries which have already been presented in my report as having occurred among the regular troops during the calendar year 1898. Again, some of the reports, although relating to the cases of soldiers of the Regular Army, are not to be found in the statistics already submitted because of their occurrence since the close of the calendar year.

To show how successfully antisepsis may be carried out in field surgery, three cases were reported from the division hospital of the Second Army Corps, at Camp Alger, Va., by Maj. William H. Devine, of that command. Other cases than those given as illustrations were operated on, and recovery without any severe symptom or complication was the result in all except in the first of the specially reported cases, in which, from the severity of its character, there was but little hope of saving life.

CASE 1.—O. B. H., private, Troop C, New York Cavalry, July 3, 1898, received kick of horse. A short while after accident happened was removed to First Division hospital. His appearance indicated condition of great shock. He was extremely pale, pulse small, and extremities cold. The following medical officers were present at examination: Majors Cooke, Devine, Crile, and Parke; Lieutenants Montelius and Washburn. The left abdomen was enlarged, tense, and manipulation detected fluctuation in this region.

Diagnosis.—Rupture of spleen, with hemorrhage into the abdominal cavity. The case was apparently hopeless, and it was the unanimous opinion of the surgeons that operation would give the only chance.

Operation performed July 3, at 6 p. m.

Preparations for operation.—Orders were at once given to have water boiling in wash boilers and to sprinkle the ground in and about the hospital so thoroughly as to prevent dust. Several basins and trays were sterilized by immersion (ten minutes) in the boiling water. The water used for the operation and intracellular infusion was passed through a Berkefeld filter and collected in sterilized buckets and basins. The instruments and dressings were placed in the sterilizer. A dozen towels were boiled during the process of sterilization. The operator and assistants prepared their hands, while the stewards arranged the operating table and the table for instruments. An apparatus for infusion of sterile normal saline solution was arranged by utilizing a fountain syringe. To the end of a rubber tube a needle from the Allen's bag was attached. The whole apparatus was easily sterilized by boiling. In the meantime the patient, well wrapped in blankets, was placed upon the operating table, and, taking advantage of the slope upon which the hospital was pitched, a favorable incline of the patient was secured. During the reduction to surgical anæsthesia the field of operation was surgically prepared. By the time reduction was completed everything was in readiness for operation. The table was placed near the entrance to the hospital, so that if necessary it might be placed in the open air, to secure the necessary light, as the sun was going down. The zone of operation was well covered with sterile towels.

Operation.—Operator, Maj. George W. Crile; assistants, Majors William H. Devine and C. W. Parke and Lieutenant Montelius. There was no external mark of the blow. A median incision 3 inches long, midway between the ensiform cartilage and umbilicus, was made. Free blood escaped. On entering the cavity the colon was found distended and pressing against the anterior wall: the liver was found to be normal; free blood was found everywhere in the cavity; on the right side it was fluid, on the left side it was clotted toward the region of the spleen, and following toward the area of densest clotting as a guide to the blood longest shed, three rents in the spleen were discovered. A large quantity of blood was turned out by manipulation of the parts, and an oblique incision was carried down parallel with the costal border and three-quarters of an inch below, until sufficient space could be developed to suture the rents. On bringing the spleen to presentation to the wound it was seen to be extensively lacerated and contused in its anterolateral parts. There was one main rent involving the entire thickness of the organ and extending about 3 inches. There were three minor rents, two of which involved the upper surface and the free border, and one near the pedicle, over the under surface. All were sutured with silk, some continued and some interrupted, depending upon the degree of brittleness and the depth of the wound. After the sutures were placed there was no further hemorrhage, and after clearing away the blood and cleansing the part with sterile salt solution the organ was returned and gauze drains placed, so as to drain the area of the suture and injury. The abdominal wound was then quickly closed by sutures. Several times during the operation the patient's condition seemed bad, but he rallied well.

During the operation normal salt solution was administered by apparatus extemporized as already explained. The patient was given strychnine, one-sixtieth of a grain subcutaneously.

After-treatment.—Patient placed upon cot, wrapped up in a number of blankets, and abundance of artificial heat applied. The foot of the cot was well elevated.

He soon recovered consciousness. The only medication consisted of strychnine, one-sixtieth of a grain hypodermatically every two hours. Six hours after the operation the saline solution was allowed to flow into the loose tissues below the axilla on each side. Patient was in cold perspiration continually for six hours after the operation; the skin then became warm.

He was rational until near the end. Sixteen hours after operation he suffered considerable retching; iced champagne was administered, giving some relief. He died about twenty-four hours after the operation.

Case 2.—C. H., private, Eighth Pennsylvania Regiment of Infantry, United States Volunteers; admitted to division hospital August 7, 1898.

Diagnosis.—Appendicitis. Temperature 102°, pulse 100. Marked tenderness in region of appendix and extending through entire right iliac region. A large mass about the size of clenched fist could be felt. The patient was examined by Lieut. Col. A. C. Girard, Major Cooke, and the consulting board—Majors Allers, Focht, and Smith. The diagnosis was confirmed and an operation deemed advisable and palliative treatment recommended. The patient was placed on liquid diet; morphine suppository and hot applications were employed to allay pain.

August 14, on recommendation of the consulting board, the operation was performed. Operator, Maj. William H. Devine, assisted by Majors Allers and Smith and Acting Assistant Surgeon Eicher.

Operation.—An incision about 3 inches long, commencing about an inch above the middle of Poupart's ligament and extending toward the anterior superior spine of the ileum, revealed the center of a circumscribed abscess. The appendix was found to be gangrenous and contained several enteroliths resembling lemon seeds. The cavity was washed out with a gentle stream of hot water from fountain syringe and then packed with iodoform gauze. At the end of a week discharge had slight odor, and the wound was cleansed daily with a solution of peroxide of hydrogen. Temperature and pulse remained nearly normal during convalescence. The patient was removed to his home three weeks after operation. Antisepsis was conducted with same care as in previous operation.

Case 3.—C. E., private, Company D, Thirteenth Pennsylvania Infantry, United States Volunteers, was injured the evening of July 18, at Dunn Loring, Va. While running along his company street he ran against the point of a bayonet fixed to a gun lying against the stump of a tree. His regimental surgeon, Maj. W. E. Keller, when summoned, found him lying in the company street. There was well-marked shock, and a small portion of omentum was protruding. He washed the surrounding surface with corrosive sublimate solution, placed a first-aid packet over the wound, and telephoned to hospital for ambulance. While awaiting the arrival of the ambulance the patient complained of intense pain over the region of the bladder, with desire to urinate. He was catheterized, and about 4 ounces of apparently normal urine removed. He was admitted to First Division Hospital about 9 p. m. The journey from his quarters was 2 or 3 miles, and when arrived an examination showed a small, weak pulse, extremities cold, and other signs of collapse. The wound, triangular in shape and three-quarters of an inch long, was situated in the right iliac region near the appendix, and a piece of the omentum an inch long protruded. There were present Majors Cooke, Wyeth, and Parke. Operator, Major Devine, assisted by Major Keller. The appearance of protruding omentum indicated the removal of the exposed portion to dispel the fear of sepsis. It was tied at base with aseptic catgut ligature, removed, and the stump pushed back into the abdomen. The wound was sewed up with silk ligature and healed by first intention. There was no elevation of temperature, and nothing marred the convalescence. He was discharged in ten days.

Capt. W. C. Borden, assistant surgeon, United States Army, in an account of the surgical work performed by him during the year ending June 30, 1899, at the general hospitals at Key West, Fla., and Washington, D. C., states that in a total of 108 surgical operations the peritoneal cavity was opened thirty-five times, one extensive operation was done on the kidney and ureter, one abscess of the liver was operated on, and numerous cases of excision of veins and removal of foreign bodies were treated. All these cases progressed rapidly to recovery and in all cases originally clean the wounds of operation healed by the first intention. Both of these hospitals were equipped with all modern appliances necessary to permit of surgical intervention by the best aseptic and antiseptic methods.

Maj. L. C. Carr, brigade surgeon of Volunteers, reported April 6, 1899, 17 surgical cases operated on at the general hospital, Santiago, Cuba, during the preceding month of March. These operations consisted of one reamputation for necrosis of the humerus, three for varicocele, three for stricture, and ten for the radical cure of hernia. It had been the custom to send such cases to the United States for operation on account of a fear on the part of the laity, participated in to a considerable extent by surgeons, that successful surgery was an impossibility at Santiago de Cuba. The success of Major Carr's cases was of practical interest in this connection.

Lieut. Col. Calvin DeWitt, deputy surgeon-general, United States Army, commanding the general hospital, Fort Monroe, Va., forwarded brief histories of 85 gunshot wounds, each accompanied by a photograph taken by Acting Asst. Surg. Edward J. Meyer. The wounds were received July 1, 1898, at Santiago, Cuba, and the photographs show their condition at a period from three to six weeks later.

The only reported case of ligation of the common carotid artery occurred in the service of Maj. Frank W. Dudley, surgeon Eighth California Infantry, at Camp Barrett, Cal. A soldier was stabbed in the neck during a quarrel. He walked a distance of 75 feet unaided, when he fell from loss of blood. An officer stuffed a handkerchief into the wound and the patient was conveyed on a litter to the regimental hospital. On arrival he was unconscious and exsanguined. The left common carotid and jugulars were found to be severed. After ligating the ends of the cut vessels the patient was put to bed between blankets and surrounded with hot-water bags; normal salt solution was introduced into the system by enemata and by injection beneath the skin of the abdomen and chest. Death took place at the end of sixteen hours during which time there was no return of consciousness. The prolongation of the existence of this almost bloodless patient for so many hours after receiving the wound was attributed to the free use of salt solution.

Stab wounds of the left subclavian vein and pericardium were successfully treated in a case reported by Capt. Walter D. McCaw, assistant surgeon, United States Army, Fort Porter, N. Y., December 31, 1898

Private F. W. U., Company G, Thirteenth Infantry, was stabbed by a soldier in a quarrel in the city of Buffalo, N. Y., on the night of November 19, 1898. The weapon used was a large-bladed pocketknife. There were four wounds; two deeply punctured wounds of the right shoulder, a stab directly under the left clavicle, severing the subclavian vein, and another over the heart causing a slit in the pericardium one-half inch in length and crescentic in shape. The patient was taken to the Fitch Emergency Hospital, where his wounds were dressed by Dr. Edward J. Meyer and the house staff. The wound under the clavicle was enlarged and the severed vein tied. The wound over the heart was carefully explored, enlarged, and the rent in the pericardium sutured. Both wounds were then closed and dressed. The patient suffered much from shock and hemorrhage, but made a rapid recovery under the skillful treatment he received at the Emergency Hospital. All his wounds were healed, but he was still very weak and suffered from pain in the region of the heart, and inability to use left arm. Any exercise sets up heart palpitation. [This man was discharged from the service January 28, 1899.]

A fracture of the skull with protusion of brain matter was reported in a case treated by Henry du R. Phelan, acting assistant surgeon, Iloilo, P. I., February 9, 1899:

Private H. S., age 22, G, Sixth Artillery, while on guard on board a water boat alongside the transport *Newport*, in the bay of Iloilo, Philippine Islands, during the evening of January 4, 1899, was struck upon the head by a Filipino armed with some sharp instrument.

Upon examination I found an incised wound of the skull on the top of the vault, about three-fourths of an inch posterior to the bregma, and 2½ inches in length, transverse to the long axis of the head. The front portion of the bone was depressed, and both parietal bones fractured down to the squamo-parietal suture; possibly the temporal bones were fractured as well, as both halves of the skull could be moved independently. A small fragment of the outer table of the right parietal bone was found to be detached at about the level of the superior curved line, and was removed. Through the aperture at the vertex the lacerated dura mater and the exposed brain matter were protruding.

Although conscious from the time the injury was received, the patient was suffering from shock, from paralysis of the right leg and foot, and from a slight loss of power in the right arm; the latter, however, being but temporary. Three hours after the occurrence of the accident the man recovered sufficiently to allow an operation to be performed. Maj. E. R. Morris, brigade surgeon, operated, with the assistance of Dr. Henry du R. Phelan, surgeon of Light Battery G, Sixth Artillery, and Dr. Charles A. Dukes, surgeon of the steamship *Newport*, who administered the anæsthetic. The left parietal bone was trephined at a point 2 inches from the middle line of the skull, and the opening enlarged by means of a rongeur. The depressed bone was elevated, the lacerated meninges trimmed off, and the protruding brain matter replaced. No clot was found. Curiously enough the superior longitudinal sinus escaped injury, though the wound crossed the middle line of the skull.

The pericranium and scalp were brought together by means of catgut sutures and drainage provided for. The patient revived readily after the operation, and recovery was uneventful, the wound healing by first intention. On the following day the rectal temperature rose to 101.5°, and during the rest of the week it varied from 99° to 99.5°. From the ninth to the fifteenth day the temperature was taken by the mouth, and ranged from 98.5° in the morning to 99° in the evening. Since then no record was taken till February 9, when the buccal temperature was found to be normal. On the day following the operation the pulse varied from 120 to 100; on the two succeeding days it remained at 80, and for the following two weeks it varied from 70 to 52, the mean morning pulse being 59. At the present time (February 9, 1899) it is normal. The respiration has been unaffected.

On the night of the operation the man complained of pain in his right leg only, but this was probably a result of his fall. Subsequently he made no complaint of pain, either in his head or elsewhere. His appetite and spirits have always been excellent. On the ninth day he was allowed to sit up in bed, and on the tenth he was taken out of doors on a chair and remained up for an hour, when he complained of dizziness. This disappeared upon his return to bed. On the thirteenth day he was again allowed up, and was then able to walk with the assistance of his nurse. On the fifteenth day the dressings were removed permanently and the wound was found to have healed by first intention.

At the present time the paralytic symptoms of the right leg and foot show no change from what they were one week after the accident. The motions of flexion, extension, and outward and inward rotation of the foot are weak and limited. There is a loss of sensation over the entire leg and foot, with the exception of small areas of parasthesia located one on the mid-dorsal region of the foot, two on the middle of the plantar region, and one at the tip and ball of the great toe on the inner half. On the thigh the area of anæsthesia is confined to the front and internal surfaces. The flexors of the thigh are weak, as well as the internal rotators, allowing the limb to rotate out when flexed. If, when standing erect, with the ankles together, the man closes his eyes, he falls over to the right side. Should he bear his weight upon the right limb, the knee flexes either forward or backward, causing a loss of support on that side. Without the aid of vision he is unable to appreciate the sensation of contact of his foot with the floor in standing, excepting a slight pressure at the hip. The senses of pressure, touch, and temperature are wanting in the entire limb, except at the points already mentioned. There is exaggerated patellar reflex on both sides, and ankle clonus on the right side. There is some vaso-motor disturbance, causing a lowering of the cutaneous temperature of the right leg and foot. There is no atrophy as yet. The mind is clear, but there are occasional attacks of vertigo and headache. The man was in a splendid physical condition at the time of the accident. [He was discharged March 17, 1899, on account of paresis of the right leg, interfering with locomotion, and attacks of headache and vertigo following his injury.]

A case of acute otitis media with invasion of the mastoid cells following measles was reported by James E. Miller, acting assistant surgeon, Fort Crook, Nebr., April 30, 1899:

On the morning of April 6, 1899, I was asked to see, with Maj. C. K. Winne, surgeon, United States Army, a patient, Private F. E., Company E, Sixteenth Infantry, aged 23 years, who had a history as follows: Left ear discharging for three weeks following convalescence from measles. The usual measures for the arrest of otitis media were employed by the surgeon in charge. Patient was kept in bed and the ear irrigated with hot water often. He was irritable, peevish, septic, had cerebral manifestations, nausea, and vertigo. There was an immense escape of pus from his ear, pain was indefinitely located over left side of head and along sterno-cleido-mastoid muscle. When we saw him on April 7 his irritability and pain were marked, and he was unconscious during the afternoon and evening. An examination revealed a large perforation at the anterior superior quadrant; superior segment of drum whitish and sodden looking; canal free, except slight swelling. The tissues over the mastoid were swollen, hot, and œdematous, very tender on pressure, with redness, swelling, and great pain whenever pressure was made over the mastoid antrum and apex.

The advisability of opening the mastoid for the relief of continued pain, which would yield to no therapeutic measures, was considered, but we concluded to wait and watch until the next day, in the meantime employing sedatives and applications to the mastoid. On the following day his pain still continued, with no sleep at night, look septic, speech slow, intellect dull, no motor or sensory paralysis; vertigo, nausea, and vomiting when patient raised his head. The patient was prepared for opening the mastoid antrum in the usual way, the exploratory incision through muscles being 3 inches in length. On chiseling into the mastoid we found it soft, the antrum "large" being reached at the depth of three-quarters of an inch; a small amount of pus was removed. The post superior wall of the meatus was broken down and the parts curetted. Free communication was established between the external meatus and antrum, manifested by syringing meatus and vice versa. After the operation the upper portion of the wound was closed with six sutures, the lower portion being left open for drainage. A piece of iodoform gauze was used, the ear being covered with the same material; a layer of sublimated gauze and absorbent cotton was placed over this and the whole bandaged. The patient was put to bed and had a fair night's rest, with cessation of pain. During the night the temperture was 103°, normal in the morning; pulse varying between 65 and 86; appetite fair; temperature varying until April 16, when it went to normal, and from this time on the case improved rapidly and seems apparently cured. Sutures were removed on the sixth, seventh, and eleventh days after operation; wound healed by first intention. [This soldier was returned to duty May 16, 1899.]

Fracture of the fourth cervical vertebra, reported by J. H. Stone, lieutenant and assistant surgeon, United States Army, Reserve Hospital, Huntsville, Ala., December 1, 1898.—Corporal D. G., Troop H, Tenth United States Cavalry, was admitted into hospital at 10.40 p. m., November 11, 1898. The patient was intoxicated but not comatose. The wound of entrance was near the angle of the right jaw; there was no wound of exit. There was total paralysis on the right side, with partial paralysis on the left side, and loss of sensation over the shoulders and upper thoracic regions. His pulse was almost normal, and his respirations were somewhat rapid but not labored. There was no loss of control over urination and defecation.

The wound was cleansed and dressed antiseptically, and an opiate given to relieve pain. On the following morning the patient was found to be resting comfortably and was able to move the muscles of the right shoulder to a slight degree. He had completely regained motion in the left arm and leg. He was perfectly rational, and I had every hope of his ultimate recovery. A purge was administered and the nurse was instructed to rub the paralyzed parts with alcohol. The patient continued to improve until the morning of November 13, when he passed off into a deep sleep from which he could not be aroused. His pulse became very strong and bounding, then full and slow, and finally weak and rapid. His respiration failed first.

He was asked while rational whether or not he had any memory of the circumstances of the shooting, and he said that he had not. He only seemed to know that he had been shot while on his way home to his camp, for what reason or by whom he knew not.

Great interest was shown when the post-mortem examination confirmed the diagnosis as made when the patient was admitted. It was found that the bullet had struck the body of the jaw and had been deflected downward and backward, lodging in the body of the fourth cervical vertebra, fracturing this and causing one fragment to impinge upon the cord, impressing the anterior surface of the cord more on the right than on the left. The hemorrhage, which, from the clinical history of the case, must have resulted some time after admission to the hospital, had surrounded the cord and extended up to the medulla and presumably had been the immediate cause of death because of the pressure on the vital centers.

Fracture of fifth cervical vertebra, reported by Harold W. Cowper, acting assistant surgeon, United States Army, Columbus Barracks, Ohio (report accompanied by skiagraphs and specimen).—Corporal M. T., Company L, Seventeenth Infantry, age 22, on December 20, 1898, fell from horizontal bars, while hanging head downward about 2 feet from an earth floor. Nothing broke the force of the fall, and his head was forcibly flexed. No unconsciousness resulted. He was brought immediately to the hospital, conscious and complaining of inability to move his legs, loss of sensation, and pain in back of neck; respiration almost entirely diaphragmatic, so that articulation was of a jerky character owing to shallow inspirations; pulse full, regular, and noticeably infrequent. There was complete paralysis, both motor and sensory, of the legs. Cutaneous anæsthesia extended to the lower border of the second rib, above which there was hyperæsthesia. Power in arm muscles was greatly decreased, there being complete paralysis of flexors of wrist and extensors of forearm; the latter, however, soon regained slight power. Sensation was present except over a small area on the forearm and dorsal surface of hand, which was not accurately defined. The pupils were equally contracted, but the reflexes to light and distance were normal. The patellar reflexes were absent, but a very slight response of the plantar reflex was obtained; this, however, could not be elicited on the second day. The cremasteric reflex was obtained several days later. There was tenderness over the cervical vertebræ, particularly marked about the fifth. No crepitus or unnatural mobility was discovered.

Pain in the neck disappeared about the second week, and motion became free. There was retention of urine throughout, also incontinence of fæces. During the last ten days the patient excreted an inordinate quantity of light-colored urine, approximately 6 liters per day. Albumen and sugar were absent. About the third day an area of dry gangrene developed on the left heel, and a few days later a bed sore appeared on the right buttock.

About January 1, 1899, a purulent discharge from the left ear was discovered. A purulent urethritis was present throughout. The condition remained unchanged until the last three days, when the pulse became irregularly intermittent, and during the last twenty hours the patient was unconscious, pulse remaining good, but respiration being of a gasping character, and entirely diaphragmatic.

Treatment was symptomatic—local applications of ice, stimulation, etc. In consultation, laminectomy was decided against, chiefly on account of the location of the lesion, the uncertainty as to its extent, and the probability of death from shock or anæsthesia. Four X-ray photographs were taken with a view to operation. No. 1, a direct antero-posterior view, apparently exhibits nothing abnormal. No. 2, taken obliquely, shows an abnormal relation at least between the fifth and sixth cervical vertebræ. The crossed wire seen in the pictures was placed over the spinous process of the first dorsal, so that identification could more readily be made. The section of spinal column sent herewith includes the axis and second dorsal. The impacted fracture of the body of the fifth cervical vertebra is plainly seen, and probably explains the appearance in photograph No. 2, mentioned above. Fracture of the right lamina of the fifth cervical is also present. The vertical section shows considerable pressure and extensive myelitis.

Two successful cases of thoracotomy are submitted below. In one the operative proceedings were necessitated by the results of a gunshot injury of the chest, in the other by a septic pleurisy following a suppurating shell wound of the arm.

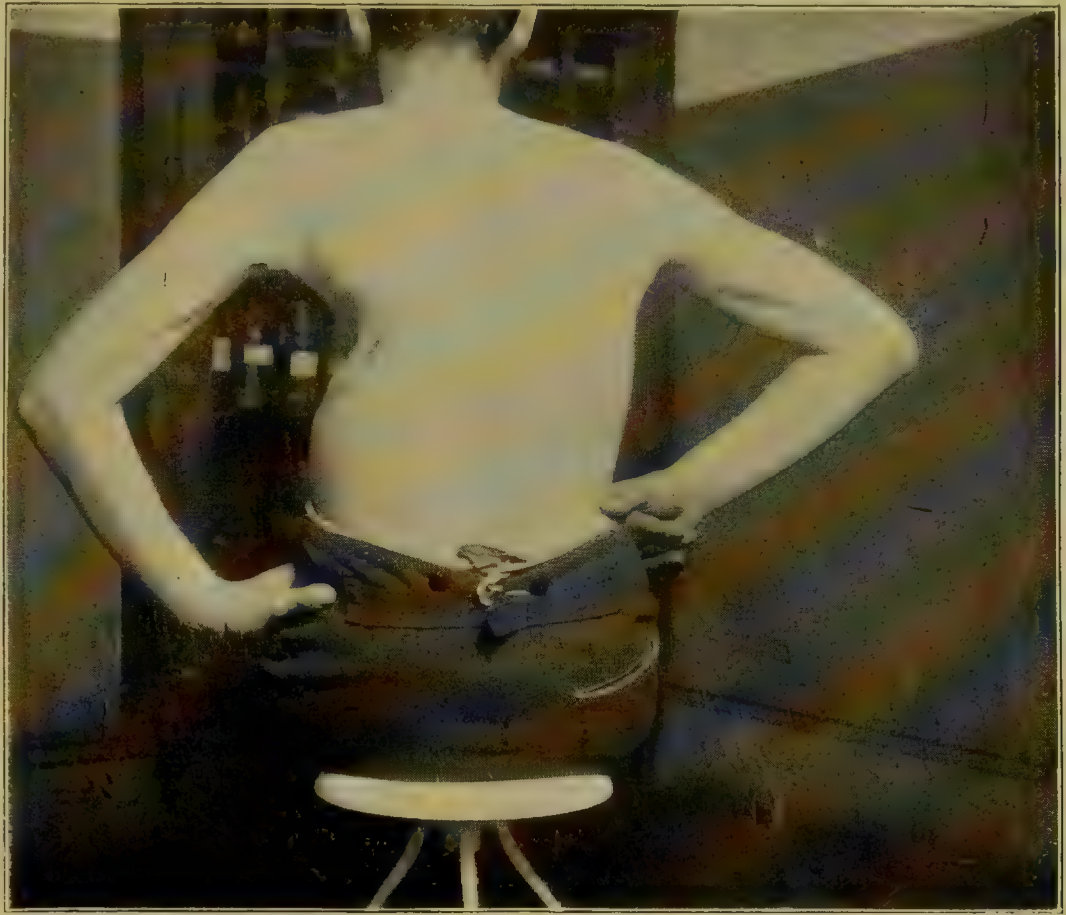
Pyo-pneumothorax, reported by Maj. James P. Kimball, surgeon, United States Army, Fort Columbus, N. Y., February 28, 1899.—Private H. P. D., Company D, Thirteenth Infantry, received a gunshot wound July 1, 1898, in action near Santiago de Cuba. The missile, a Mauser bullet, entered the outer surface of the left arm, passed through the biceps near its center, and escaped from the inner surface of the arm; then entered the left side of the thorax, fracturing the fourth rib in the axillary line, perforated both lungs, and escaped from the right side of the thorax between the fourth and fifth ribs in the post axillary line. The flesh wound of the arm healed by first intention, as did the wound of exit from the chest. The wound of entrance with fracture of rib on left side of the chest was followed by pyo-pneumothorax of the left pleural cavity. A drainage opening was made in front July 6, and a second one July 28, below the angle of the scapula, but without material benefit. The lung became collapsed, leaving a large cavity which held 38 ounces of fluid. On August 26 Estlander's operation for obliteration of the cavity was performed. An incision was made from the left nipple downward to the tenth rib and back to the fourth dorsal vertebra; a flap was raised, and the fourth, fifth, sixth and seventh ribs resected. The cavity was subsequently irrigated every other day with a hot saline solution, and a dry dressing was applied. The cavity has gradually contracted, and, at date of photograph, February 19, 1899, there remains a cavity, or rather a sinus, with its opening in the axillary line just above the eighth rib, which holds barely an ounce of fluid. There is conspicuous deformity of the chest. The soldier appears in good condition, but suffers from marked dyspnœa on exertion. [He was discharged at expiration of term of service, disability total, February 17, 1899.]

Thoracotomy for empyema, reported by Capt. W. C. Borden, assistant surgeon, United States Army, June 30, 1899.—Private J. A. A., Company H, Sixteenth United States Infantry, was wounded July 1, 1898, by a fragment of shell, which passed through the fleshy part of the arm. July 5, on his arrival at the general hospital, Key West, the wound was suppurating freely. July 6 the patient was anæsthetized and the wound thoroughly cleansed with peroxide of hydrogen and normal salt solution; a counter opening was made to insure drainage, and an iodoform gauze drain inserted. July 7 symptoms of septic pneumonia appeared; the inflammation soon invaded both lobes of the left lung, and septic pleurisy of the right side followed. Empyema was suspected, and on July 26 2,000 c. c. of pus were removed by aspiration. July 28, under anæsthesia, a free incision was made into the pleural cavity between the seventh and eighth ribs, the cavity thoroughly washed out, and a double rubber drain inserted. Through this the pleural cavity was frequently washed out, and the cavity gradually grew smaller, but had not entirely closed when he was transferred North August 22.

The case was interesting in that the pneumonia and the empyema were probably of septic origin from the infected wound. The wound did well after the initial cleaning and soon healed, but the patient was extremely exhausted and weakened by the long-continued suppuration from the pleural cavity. [This soldier was returned to duty with his company November 26, 1898. He was discharged March 18, 1899, on certificates of disability, which stated the cause as follows: "He had either a pleurisy or empyema on left side, which was opened and thoroughly drained; circumference of chest now same on both sides, with increasing respiratory murmur on left side. He is not strong enough to endure exposure on active duty or in the tropics. He also was wounded in middle third left arm (flesh wound)." He was not on sick report at the time of his discharge.]

Three cases are given as showing surgical intervention in abdominal and pelvic injuries:

Gunshot wound of the abdomen with cœliotomy, death and autopsy, reported by Capt. Charles E. B. Flagg, assistant surgeon, United States Army, Macon, Ga., January 1, 1899.—Private L. A., Company A, Third North Carolina Infantry, colored, was brought to the hospital, First Division, First Army Corps, December 26, 1898, at about 4.30 p. m., having just been shot in a house of ill repute in Macon, Ga. Examination showed two bullet wounds on a line horizontal with the umbilicus, the entrance wound 3 inches to the right, the exit 4 inches to the left. The wound was found to communicate with the peritoneal cavity. The patient was in a condition of excitation with shock. His condition was fair. Half an hour after admission ether was administered by an acting hospital steward, no surgeon being then available for this purpose, and the abdomen was opened in the median line. A contusion of the jejunum was inverted and covered by healthy intestine, six mattress sutures being inserted. The mesenteric vessels supplying a portion of the transverse colon, where there was a rent and contusion 12 cm. long, were then ligated and retention sutures placed preparatory to an end to end anastomosis with Halsted's cylinders. Anastomosis was deemed permissible, as an acting assistant surgeon who came in soon after the anæsthetic was commenced and superintended its administration, reported the pulse as good. At this point, about three-quarters of an hour after the commencement of the operation, respiration ceased and the loop of intestine was immediately returned to the abdominal cavity, strychnia and nitroglycerin administered hypodermically, artificial respiration practiced, and the sphincter ani rapidly dilated. All efforts at resuscitation proved futile.



CAVING IN OF CHEST AFTER ESTLANDER'S OPERATION.

At the autopsy sixteen wounds of the intestine and mesentery were found. One wound of the intestine and one of the mesentery that had not received attention at the time of his death would have required intestinal suture. The others would probably have done no harm if left to themselves. About 60 c. c. of clotted blood was found in the peritoneal cavity. An extensive contusion was present under the stomach just above the pancreas and over the solar plexus. The bladder was distended, and a moderate contusion was present between the bladder and rectum. The tissues over the twelfth rib, just under the diaphragm, also showed evidence of injury. The bronchial tubes were filled with frothy mucus and the right heart was distended with dark blood. The liver, spleen, and kidneys were apparently normal. There was no evidence of external injury, except the two bullet wounds already mentioned.

I believe this death to have been due to the ether.

Splenic abscess treated by First Lieut. Ira A. Shimer, assistant surgeon, United States Army, in general hospital, Santiago de Cuba, reported March 27, 1899, by Maj. L. C. Carr, brigade surgeon of volunteers.—F. M., private, Company H, Fifth United States Volunteer Infantry; admitted to hospital January 10, 1899; age, 18; previous occupation that of a painter. He enlisted in the Volunteer Army on June 17, 1898, and came to Cuba with his regiment August 12, 1898. About the middle of September he began to have malarial fever of a tertian type, which seems to have been especially virulent, the temperature at one time having reached 107°. This fever then ceased, and the patient began to have slight pain in the left lumbar region and on the left side of the umbilical region. He describes the pain as colicky, but there was no disturbance of the bowels. This pain continued until December 7, when the patient had a chill. Next day he reported at the regimental hospital. While here he noticed a small swelling at the region above indicated. He was kept in this hospital until January 10, 1899, when he was transferred to the general hospital, Santiago. The nature of the treatment while in the regimental hospital can not be learned. Condition of patient on admission: Poorly nourished, somewhat emaciated. Heart, negative. Lungs, negative. Skin, pale and anæmic. Liver, slightly enlarged. Spleen, the area of splenic dullness was as follows: Beginning above at the ninth rib, extending downward to a point 2½ inches below the umbilical line to the outer side and well back to the lumbar region: to the inner side to a line one-half inch to the right side of the umbilicus. The point of greatest prominence in this area was 4 inches to the left of the umbilicus and one-half inch above the umbilical line. There was no redness at this point, but slight tenderness on palpation and marked fluctuation. The area of fluctuation extended over a space 1½ inches in diameter. Around this area was a ring of induration about 2 inches in diameter. The distance from the umbilicus to the spinous process of the fourth lumbar vertebra around the left side was 2½ inches more than around the right side.

The area of fluctuation was explored with an aspirating needle on January 13, and a small quantity of chocolate-colored pus removed. An incision three-fourths of an inch long was made over the area, and 600 c. c. of pus removed. (To give some idea of the tension on the walls of the abscess, a stream of 1 inch in circumference was thrown to a height of 10 inches.) The cavity was then washed out with a 1 to 4,000 solution of bichloride of mercury; a rubber drainage tube was inserted and aseptic dressings applied. Strychnine sulphate, gr. $\frac{1}{30}$, and bichloride of mercury, gr. $\frac{1}{32}$, three times a day were given.

The patient's temperature on admission to the general hospital was 101.2°. At the time of evacuation of the abscess his temperature was 102.8°. On the morning of January 17, three days after opening the abscess, his temperature was normal. On the 20th the evening temperature was 102.6°, the discharge had lessened considerably, and on examining the cavity a large piece of splenic tissue was found obstructing the opening; this was removed. The discharge again increased and continued to be profuse. On January 24 the temperature suddenly rose to 103.4°. A small pocket of retained pus was found underneath the line of induration below the incision. This area was also drained. Since that time the patient's temperature has been practically normal, the discharge gradually lessening and latterly becoming of a sero-purulent nature.

On March 1 the patient was able to be up and walk around. The sinus is entirely closed at date of writing. The spleen is of almost normal size and in its proper position. There is a slight thickening of the abdominal wall at the site of the incision. In walking the patient leans slightly to the left side. When asked his reason for assuming this position, he says that whenever he tries to stand erect there seems to be some tension between the present location of the spleen and the site of opening of the abscess. [This man was furloughed and was at home when his company was mustered out May 31, 1899, at Birmingham, Ala.]

The microscopical examination of the discharge from the abscess was made by Acting Assist. Surg. F. W. Fabricius, United States Army, and is as follows: The pus contains red blood cells, mostly crenated, a few of them containing pigmented parasites, both large and small; some of the larger blood cells contained smaller red blood cells; of these some were nucleated. Free malarial pigment was also present, with pigmented leucocytes: also lymphocytes, eosinophiles, crystals of hæmatoidin, and granular débris. The large slough of splenic tissue above mentioned, 3 by ½ by ½, contained the same cellular changes.

Splenic abscess is an exceedingly rare disease, as scarcely any mention is made of such cases. In this case there was absolutely no history of traumatism or of any external irritation. From the history of the case, this patient seems to have had a tertian malarial fever, extending over a period of three months. He states that his fever usually was very high. The repeated congestion of the spleen due to the frequent chills undoubtedly caused an enlargement of the organ. It is possible that during one of the numerous attacks from which this patient has suffered there may have been a localized hemorrhage into the splenic tissue: this becoming infected, the abscess resulted. Or this may originally have been an infarction of the spleen; the area of the infarct being on the outer anterior surface, infection followed and adhesions were formed between the spleen and the anterior abdominal wall.

Rupture of the bladder, operation, death and autopsy, reported by E. F. Robinson, acting assistant surgeon, Fort Hamilton, N. Y.—F. S., Battery I, Fifth Artillery; age 23: Irish. On the evening of November 15, 1898, after drinking heavily of beer, this soldier patient ran into the corner of a billiard table in the post canteen, striking with such force in the pit of the stomach that he was thrown violently to the floor. He was seen immediately after the injury and found to be in a condition of profound shock, suffering great pain. Upon his admission to the hospital, however, his pulse was but 80 and his temperature normal. His pain increasing in severity, morphia was given hypodermically and was repeated three times during the night, with a twentieth of strychnine added. Ice was applied to the abdomen. Forty ounces of urine, drawn by catheter, was at first clear, afterwards bloody, and at the very last a small clot was passed. The abdomen was rigid, slightly tympanitic, and very tender.

A laceration of the wall of the bladder, with possible other internal injury, was diagnosed, but a complete rupture of the organ was excluded by the fact that so large an amount of urine had been drawn by catheter. The character and rapidity of the pulse also supported this opinion.

For the next twenty-four hours the patient's condition remained unaltered. A purgative dose of calomel and a turpentine enema were given without result. Suddenly, on the morning of the 18th, his condition grew worse. It was decided to open the abdomen at once.

After thorough antiseptic preparation an incision was made in the median line, 2½ inches below the umbilicus. The omentum and intestines were found adherent to the parietal peritoneum. The intestines were bound together by masses of inflammatory lymph and the abdomen was filled with a sero-purulent straw-colored fluid, showing that general peritonitis had already developed. A transverse horizontal rent was found about 1½ inches below the symphysis pubis, in the posterior wall of the bladder, extending completely across the organ and easily admitting the whole hand.

Sutures of catgut were passed through the posterior edge of the vesical wound and drawn up through the lower angle of the abdominal incision, where they were clamped by hæmostatic forceps. The anterior portion being short and firmly fixed by the unyielding pubic bones, the posterior portion was thus easily brought up and the edges very correctly approximated. A piece of gauze was now placed just behind the bladder, extending well down into the pelvis. It not only assisted in approximating the wound, but also acted as a drain. The upper portion of the abdominal incision was closed by sutures of silk-worm gut and a protective antiseptic dressing was applied. A soft catheter was passed through the urethra to drain the bladder. Although in a most critical condition while on the table, the patient reacted fairly well from the anæsthetic. Repeated hypodermic stimulation, however, was necessary, and as much as a quart of normal salt solution was given during the next twenty-four hours. But little blood was lost during the operation. Two hours after being removed from the operating room the pulse was 130 and very weak. Three ounces of urine were passed through the catheter. Despite the utmost stimulation the patient gradually sank and died at 6 p. m. on the following day.

The autopsy showed no other abdominal lesion. The general peritonitis which was present at the time of the operation had extended but little. The rent in the bladder was found to be correctly approximated, and the union of the torn edges of the wound had already begun. Transversely across the bladder extended a tear 3½ inches in length, situated 1½ inches below the symphysis pubis. The pelvic peritoneum was also torn on either side of the vesical rent for the distance of 1½ inches. The posterior wall of the bladder, both above and below the point of rupture, was deeply infiltrated with blood, and measured from peritoneal to mucous surface five-eighths of an inch in thickness.

The unusual points about the case were the completeness and extent of the rupture, the slow development of signs or symptoms of serious intra-abdominal mischief, and the fact that 40 ounces of urine were withdrawn by catheter within three hours of the injury. The latter may be accounted for in one of two ways—either the rupture had at first been incomplete, the peritoneum over the posterior vesical wall remaining temporarily intact, or, which seems more probable, the original rupture was complete, and the urine being retained in the pelvis, the abdominal cavity as well as the bladder was catheterized.

Acting Asst. Surg. Arthur Irving Boyer reported, August 14, 1899, the following case of fracture of the neck of the femur:

On April 14, 1899, W. R. T., M. D., private, Hospital Corps, was brought to the Coamo post hospital, having been thrown from his horse. The description of the accident given at that time was that the horse became unmanageable and "reared," throwing the rider to the ground. The horse fell on him, injuring his left hip. At the time I examined him (about a half hour after the accident) he was suffering considerable pain, and when the limb was touched became rather hysterical. He was given an anæsthetic (chloroform) to overcome the muscular spasm that existed. There was absolutely no deformity and very little swelling. The spasm relaxed immediately under the anæsthetic. I examined most carefully for fracture and dislocation, but everything appeared normal. Measurements were made for real and apparent shortening, but none existed at that time. The symptoms, indeed, were so slight that the diagnosis of "severe contusion of left hip joint" was made. The first day he was given a hypodermic of morphine—one-eighth grain; the second day, codeine, by mouth. He improved rapidly, and as there was no untoward symptoms no splint was applied. He finally got about on crutches. For a short time his improvement was, comparatively speaking, rapid. He complained of no pain, except when the leg was pressed on the ground with considerable force; then only a "catch." As time advanced, however, the affected side seemed to be longer (i. e., the leg). This I ascribed, at the time, to the tilting of the pelvis in trying to avoid the weight on the injured part.

On May 20, at his own request, he was honorably discharged from the service on account of "severe contusion left hip joint; improved."

The patient left Coamo with me upon the abandonment of the post May 25, and returned to the United States on the *McPherson*. Upon arrival in New York I had him examined at the Post-Graduate Hospital by Dr. Lloyd, not being satisfied in my own mind that everything was as it should be. Upon clinical examination symptoms of fracture of the neck of the femur were evident. An X-ray was taken in my presence and the diagnosis corroborated. The case has attracted considerable interest in that the first symptoms were in no way consistent with such a serious fracture, and I can only ascribe my failure to make the proper diagnosis at first to the fact—and Dr. Lloyd agrees with me—that it was impacted. I regret that the mistake was made, but I do not think that the ultimate prognosis was affected by the delay. He was operated upon and the parts united by a silver nail.

I herewith inclose a certificate given by Dr. P. S. Boynton, giving the details of the case since I last saw the patient.

Statement by Dr. Perry S. Boynton.—This is to certify that I was present at the examination of and operation upon ex-private W. R. T., performed by Dr. Samuel Lloyd, at the New York Post-Graduate Hospital, and that the statements herein made by me are in essential details correct. At the preliminary examination, without anæsthesia, made on June 12, 1899, were found:

Shortening of left lower extremity to the extent of 1¼ to 1½ inches. Outward rotation of left thigh with eversion of left foot. Impaired power of voluntary motion of left limb at hip joint, and limited motion, especially of flexion and inversion. Spasm of muscles of left thigh, pain on motion, and tenderness on anterior and posterior aspect, especially in left hip joint. Occasional crepitus, especially on flexion of left hip beyond 30°.

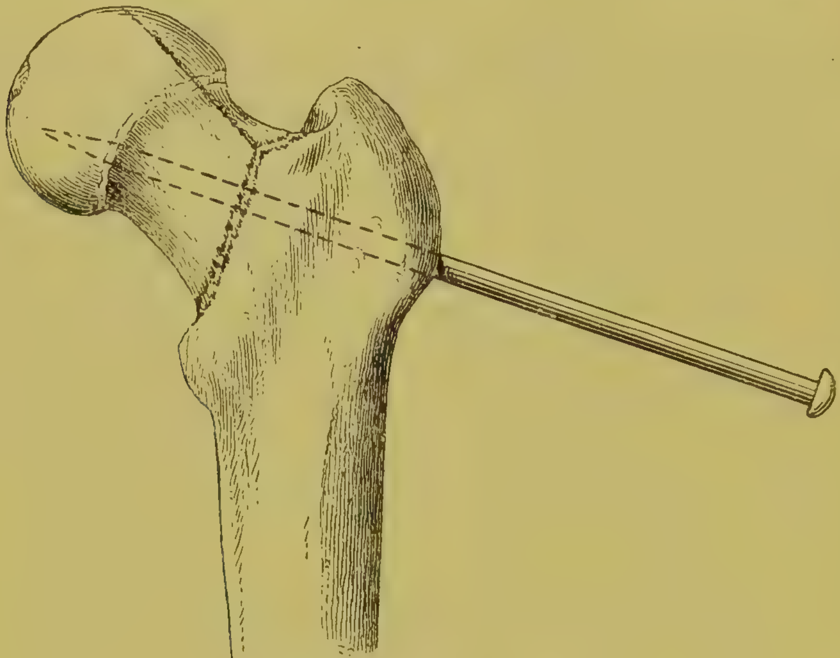
On June 14, 1899, the left hip joint was photographed by the aid of the X-ray.

At the time of operation, on June 19, 1899, the following condition of the left hip joint was found to exist: Incision was made over anterior aspect of joint and capsule exposed and opened, disclosing somewhat oblique fracture of base of neck, resembling T-fracture, extending into neck and head of femur, thereby leaving a small postero-external segment of neck and head detached from main upper fragment. Vide accompanying schematic diagram. Posterior ridge of upper (main) inverted, fragment was found impinging upon lower fragment.

Edges were freshened, reduction and fair approximation secured, and fragments firmly fixed by quadrangular steel (silver plated) pin driven from without inward through trochanter major into neck and head. The usual dressing was completed by application of plaster cast.

First dressing July 13, 1899: Cast removed and pin withdrawn. Superficial suppuration in anterior incision, probably from stitch abscess, but not involving joint or deeper structures, was found. Plaster cast was renewed and fenestra cut to facilitate interval dressings of wound.

Last dressing August 1, 1899: Plaster cast renewed and wound found to be clean and closing rapidly, pain and tenderness absent; temperature and pulse normal. No attempt at active or passive motion made. Patient at his own request discharged from hospital to-day, August 2, 1899, and sent to his home in Michigan.



Fracture of neck and head of femur.

Two amputations as reported are presented below, one of the leg for gunshot injury and the other of the arm for disease.

Amputation of leg for Krag-Jörgensen wound of ankle joint, reported by Maj. William B. Banister, brigade surgeon of Volunteers, camp hospital, Camp Mackenzie, Ga., May 30, 1899.—Private J. E., Troop M, Third Cavalry, was brought to the camp hospital at 4 p. m. April 26, 1899, suffering from a gunshot wound of right leg, accidentally inflicted. The ward surgeon dressed the wound and I saw the case for the first time on the morning of April 27. This soldier was cleaning his gun, and rose to his feet holding the piece in his left hand, with the muzzle about one foot from the right leg, when it was discharged. The bullet entered about one inch above the right ankle joint and passed obliquely downward and outward, striking the tibia, passing through the joint, and emerging from the outer side of the foot buried itself in the sand. The patient was anæsthetized, and preparations made to operate if the examination showed it to be necessary. The wounds of entrance and exit were ragged and about the same size, contrary to the general rule, especially, too, as pieces of bone had been carried through the external wound and were found in the man's shoe. On passing the finger into the wound it was found that the soft tissues beneath the skin were badly lacerated. The lower end of the tibia was shattered as high up as the finger could reach; the pieces were detached, and one large piece projected from the external wound. The fibula was fractured about one and a half inches above the joint.

The fragments of the tibia could not be pushed back into position. The soft tissues in rear of the joint were thickly sprinkled with minute particles of bone sticking in the muscular tissue.

The comminution of the tibia was so extensive, the laceration of the soft tissues along the track of the bullet was so great, though not showing from external view, that I at once proceeded to amputate about the junction of the middle and lowest third. On dissecting out the bone entering into the formation of the joint it was found that the tibia was badly comminuted and split for nearly 4 inches above the joint. A considerable portion of the lower and posterior portion of the bone was entirely gone. On turning back the soft tissues at the rear and front of the joint the muscular tissue felt as if the surface next to the bone had been sprinkled with sand from a pepper pot, owing to minute particles of bone sticking in the muscles. The particles of adherent bone extended half way down the front of the foot. The bullet roughened the surface of the astragalus and chipped off the right anterior corner of its articular surface. The fibula was not touched by the bullet, but gave way at its weakest point. The bones entering into the formation of the injured joint will be forwarded to the Army Medical Museum as an interesting specimen of the effect of the Krag-Jörgensen bullet on bones at close range. The fragments are held in position with plaster of paris, but could not have been pushed into such apposition prior to removal of the limb. The explosive effect was very forcibly illustrated by the numerous particles of bone from the end of the tibia sticking in the soft tissues. An examination of the specimen will show a considerable portion of that part of the tibia missing and filled with plaster of paris. The question now presents itself of the advisability of a primary amputation for gunshot fracture of the ankle joint, as this operation practically was.

Dr. Nicholas Senn, in an excellent article in the Military Surgeon for July and August, 1898, states that "The existence of a gunshot fracture, regardless of the extent of bone injured, no longer furnishes a legitimate indication for a primary amputation." I agree with Dr. Senn, if this statement was slightly modified, as follows: "The existence of a gunshot fracture, inflicted at battle ranges, etc.," as my experience with gunshot fractures in the Santiago campaign led to the same deductions made by Dr. Senn, but when the modern rifle is discharged within a foot of the injured joint the principle does not always hold good, because the cancellated tissue at the end of the bone is simply pulverized and driven into the soft tissues in a manner to cause the greatest possible amount of irritation and numerous minute lacerations, the comminuted pieces of bone are twisted and thrown together in a manner impossible to replace them, some of them, as in this case, being driven from one side of the joint, along the track of the bullet, out through the wound of exit and found in the man's shoe. The amount of lacerations of the soft tissues near the bone involved may be imagined. No dictum such as the one quoted can cover all cases, and the individual judgment of the surgeon must be relied upon by him as heretofore. This dictum of Dr. Senn's will do some harm and also some good, with reference only to cases where the injury is so great as to bring up the question of the necessity for amputation, for as a general rule it is true. It will do harm by enabling the timid surgeon to soothe his conscience and excuse his not operating when the interest of the patient demands it, and it will do good by causing the conservative surgeon to determine absolutely by digital examination under anæsthesia the extent and character of the injury before amputating in the face of the general principle laid down by Dr. Senn. In other words, it will increase the timidity of the first class, and make the second class of surgeons referred to find ample grounds for amputation before causing the patient to lose a limb.

Amputation of the left arm, reported by Maj. L. C. Carr, surgeon, United States Volunteers. General Hospital, Santiago de Cuba, December 30, 1898.—J. S., private, Company H, Third United States Volunteer Infantry, age 22, gave the following history: When a child, too young to remember, he fell into the fire, burning his left arm at the elbow very severely. During his earlier boyhood he had good use of his arm, but later, about his ninth or tenth year, a deep-seated injury to his elbow was made more and more manifest, the use of the joint being much impaired. When about 15 years of age he underwent an operation at the city hospital of Augusta, the operation being performed by Drs. Wright, Ford, and Morgan. The patient claims that they made a thorough exploration of the joint, which resulted in no benefit to him. He states that he had a fair use of his arm at enlistment and was taken into the service without examination. He also states that after lifting a few heavy boxes, at Augusta, his arm became disabled, a discharge from the joint made its appearance, and from that time he was never able to perform full military duty. It would be well to state that the patient claims that several years before his enlistment he had comparatively good use of his arm, but could not straighten it. He was admitted to this hospital on December 3, 1898, and assigned to ward 6, in charge of Acting Asst. Surg. Bat Smith. He complained of some pain on the night of his admission, but nothing was given him, and he passed a fairly good night.

On December 7 his pain increased and only yielded to opiates in unusually large doses. Next day he consented to an operation to obtain some relief. On December 9 an exploratory operation was made by the commanding officer of the hospital, Maj. L. C. Carr, assisted by Acting Asst. Surgs. Milton Vaughan, Frederick Combs, E. F. Nunez, G. A. McHenry, and Bat Smith. The anæsthetic used was chloroform, which the patient bore remarkably well. The examination convinced the surgeons present that amputation of the arm was absolutely necessary for reasons which will be hereafter stated. The amputation was not performed at the time, because the patient had not been notified that such a procedure might be necessary, nor had he consented to it. The following day, the conditions being explained, the patient consented to the amputation. On December 11 the patient was again put under the influence of chloroform and the arm amputated by Maj. L. C. Carr, assisted by Acting Asst. Surgs. Bat Smith, G. A. McHenry, Milton Vaughan, and John Carling. On account of the large area of cicatricial tissue on the inner aspect of the arm the antero-posterior flap operation was made. The skin being dissected back to a suitable distance, the muscles were cut through, and the bone, after the periosteum had been properly retracted, was sawn through and all rough edges rounded off. The retracted periosteum was drawn over the bone and fastened with a suture which, together with the ligature around the brachial artery, was brought to the outside of the wound. The muscles were then brought together by several interrupted sutures; the skin was drawn together by the same kind of sutures. The wound was then dressed, aristol being used, and the patient turned over to the care of Acting Asst. Surg. Bat Smith. It is needless to say that all necessary antiseptic measures were duly taken during the operation, as well as during the after treatment. Although the patient had submitted to a tedious operation forty-eight hours previously, no perceptible shock followed the amputation. The skin healed so rapidly that on the third day it became necessary to remove some of the sutures from the skin flaps, for the reason that no drainage tube was used in this operation, and although all the sutures were gathered together at the lower angle of the wound there was not thorough drainage. Removal of these sutures did not cause much gaping of the wound, the edges of which were easily held together by one adhesive strip. The suture through the periosteum came away on the morning of December 28. It was expected that after the amputation all pain would cease, yet this was not the case. It was, however, not nearly so severe as it was previous to the operation. The pain of which the patient complained may be due to one or both of two causes. First, to the accidental pressing of the musculo-spiral nerve with a pair of hæmostatic forceps during the dressing of the wound, or what is more probable, to the long-continued pathological condition of the joint and all the surrounding tissues. The dissection of the joint after amputation was made by Acting Asst. Surg. E. F. Nunez, who reported as follows: There was a fistulous opening between the olecranon process and the internal condyle of the humerus, communicating directly with the articulation. The joint had lost its normal contour. It was the seat of a subacute inflammation. By probing the impression of feeling a hard solid body without any interposed tissue was conveyed. On opening the joint it was found full of pus of an unhealthy character, which had taken the place of the synovial fluid. The extremities of the bones, especially that of the humerus, were devoid of cartilagenous coating, exposing the bony tissues to the corroding influence of the pus. The articular extremities of the bones presented a very rough and uneven surface, surrounded by a dense cicatricial tissue.

The cases submitted above will serve as illustrations of the surgical work of the past year. A report on the "Surgery of the Spanish-American War," in which special attention will be given to the history and study of cases in which the Roentgen ray was used, is now being prepared by Capt. W. C. Borden, assistant surgeon, United States Army.

RECOMMENDATIONS.

The Medical Corps of the Army, which was scarcely adequate before the war with Spain for our Army of 25,000 men, is now entirely inadequate, and should be increased as soon as is practicable.

Physicians and surgeons from civil life, however well qualified professionally, as a rule are not prepared to assume the responsibilities of medical officers charged with administrative duties and the sanitary supervision of camps. The proper performance of such duties can not be expected from a physician without military training or experience, no matter how distinguished a position he may have held in civil life.

Many of the commissioned medical officers of the Volunteer Army and of the acting assistant surgeons have made rapid progress in acquiring a knowledge of their military duties and have demonstrated their fitness for the military service. In filling vacancies in the Medical Corps these gentlemen should in my opinion have the preference when they come within the established age limit and are able to pass a satisfactory professional and physical examination.

The value of the aphorism "In time of peace prepare for war" has received additional support during our recent experience. This preparation should include a corps of trained medical officers larger than is absolutely necessary for the Army on a peace basis, and systematic instruction in military medicine and hygiene for the medical officers of the National Guard, as well as for those of the Regular Army; also instruction of line officers in the elements of hygiene, and especially in camp sanitation. It should also include the establishment of camping-grounds in various parts of the country, having an ample supply of pure water, a proper system of sewers, etc. If our volunteers could have been assembled in such camps during the late war a saving in lives and money would have resulted, which would, without doubt, have demonstrated the economy of such preparation for war in time of peace.

CONCLUSION.

Before closing this report I desire to express my appreciation of the intelligent and zealous devotion to duty which, with few exceptions, has characterized the officers of the medical department, both regulars and volunteers, and including the acting assistant surgeons.

I have been ably supported in the administration of the affairs of the Medical Department by Col. Charles H. Alden, assistant surgeon-general, in charge of the supply division of my office; Col. Dallas Bache, assistant surgeon-general, in charge of the museum and library division; Col. Charles R. Greenleaf, assistant surgeon-general, chief medical inspector of the Army; Lieut. Col. Charles Smart, deputy surgeon-general, in charge of the sanitary division; Maj. George E. Bushnell, surgeon, United States Army, in charge of the hospital corps division; Acting Asst. Surg. Anita Newcomb McGee, in charge of the army nurse corps (female); and by the chief surgeons of the various military departments. The chief surgeons on duty in the Philippines, in Cuba, and in Puerto Rico have occupied especially responsible positions, and have discharged their duties in a manner most creditable to themselves and to the Department.

The clerical force of my office has been working under the strain of enormously increased labor since the outbreak of the war with Spain and has met the task with intelligence and fidelity. The chief clerk, Mr. George A. Jones, and the older members of the permanent force generally, have been indefatigable in their efforts to prevent the work of the office from falling behind, and, by sacrificing leaves of absence due them and working out of the official office hours, have to a great extent been successful in so doing.

The following tables give in detail the statistical data on which the statements of this report are based. It has not been practicable during the past year to gather the data necessary for the presentation of Tables II, IV, V, and VIII of the international series.

I. Numerical view of the effects of disease and injury on the Army during the calendar year 1898 as compared with the corresponding data for 1897 and for the decade 1887–1896.

II. Showing, for the various arms of the service, the admissions to sick report, discharges, and deaths in ratios per thousand of mean strength for the year 1898.

III. Admissions to sick report, discharges, and deaths in ratios per thousand of strength for the year 1898, in the Islands and in the United States.

IV. Ratios of admission to sick report, discharge, death, and constantly noneffective of the Army (white and colored troops) for the year 1898 as compared with the corresponding data for 1897 and for the decade 1887–1896.

V. Movement of sickness and mortality, by months.

VI. Deaths United States Army (regulars and volunteers) May, 1898, to June, 1899, inclusive, with monthly ratios.

VII. Deaths United States Army (regulars and volunteers) May, 1898, to June, 1899, inclusive, with annual rates for the United States, Cuba, Puerto Rico, and the Pacific islands.

VIII. Number of white and colored applicants for enlistment physically examined during the year 1898, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.

IX. Nativity of white and colored recruits accepted during the year 1898, with ratios per thousand accepted.

X. Causes of rejection on primary examination among 71,250 recruits physically examined during the year 1898, with corresponding ratios per thousand of each race examined.

International Tables I, III, VI, and VII.

TABLE I.—*Numerical view of the effects of disease and injury on the Army during the calendar year 1898, as compared with the corresponding data for 1897 and for the decade 1887–1896.*

United States Army.	White.	Colored.	Total.
Average strength shown by returns of Adjutant-General	43,307	3,328	46,635
Total admissions to sick report	92,035	8,088	100,123
Per 1,000 of mean strength	2,125.18	2,430.29	2,146.94
Per 1,000 for previous year	1,180.84	1,248.61	1,186.61
Per 1,000 for preceding decade	1,243.02	1,252.38	1,243.39
Admissions for disease	83,150	7,215	90,365
Per 1,000 of mean strength	1,920.01	2,167.97	1,937.71
Per 1,000 for previous year	890.77	958.41	896.53
Per 1,000 for preceding decade	989.27	964.84	986.23
Admissions for injury	8,885	873	9,758
Per 1,000 of mean strength	205.16	262.32	209.23
Per 1,000 for previous year	290.07	290.20	290.08
Per 1,000 for preceding decade	253.74	287.54	257.16
Number constantly noneffective			3,862.68
Per 1,000 of mean strength			82.83
Per 1,000 for previous year			35.85
Per 1,000 for preceding decade			39.46
Noneffective for disease			3,221.69
Per 1,000 of mean strength			69.09
Per 1,000 for previous year			26.73
Per 1,000 for preceding decade			30.85
Noneffective for injury			640.99
Per 1,000 of mean strength			13.74
Per 1,000 for previous year			9.12
Per 1,000 for preceding decade			8.62
Days lost on account of sickness			1,409,878.00
For each man of Army			30.23
For each man, previous year			13.08
For each man, preceding decade			13.14
Average days each case was treated			14.08
For previous year			11.03
For preceding decade			11.59
Discharges for disability, all causes	499	41	540
Per 1,000 of mean strength	11.52	12.32	11.58
Per 1,000 for previous year	9.62	9.51	9.61
Per 1,000 for preceding decade	18.24	18.62	18.32
Discharges for disease	319	26	345
Per 1,000 of mean strength	7.37	7.81	7.40
Per 1,000 for previous year	7.59	7.70	7.60
Per 1,000 for preceding decade	14.97	15.40	15.07
Discharges for injury	180	15	195
Per 1,000 of mean strength	4.16	4.51	4.18
Per 1,000 for previous year	2.03	1.81	2.01
Per 1,000 for preceding decade	3.26	3.22	3.25
Deaths from all causes	1,174	111	1,285
Per 1,000 of mean strength	27.11	33.35	27.55
Per 1,000 for previous year	5.05	5.89	5.11
Per 1,000 for preceding decade	6.76	8.46	6.99
Deaths from disease	943	83	1,026
Per 1,000 of mean strength	21.78	24.94	22.00
Per 1,000 for previous year	3.18	2.72	3.14
Per 1,000 for preceding decade	4.59	6.09	4.77
Deaths from injury	231	28	259
Per 1,000 of mean strength	5.33	8.41	5.55
Per 1,000 for previous year	1.87	3.17	1.97
Per 1,000 for preceding decade	2.17	2.37	2.22

TABLE II.—*Showing, for the various arms of the service, the admissions to sic report, discharges and deaths, in ratios per 1,000 of mean strength, for the yea 1898.*

Mean strength	Cavalry.			Artillery.			Infantry.		
	9585.			9565.			20178.		
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
SPECIAL.									
Measles	20.24	......	......	15.68	......	0.10	36.78	......	0.5
Vaccinia	52.89	......	......	94.51	......	......	59.62	......	......
Typhoid fever	92.96	0.21	9.18	62.31	0.21	5.02	92.58	0.69	12.3
Yellow fever	9.49	......	1.67	1.78	......	.21	21.51	......	2.3
Malarial infections	614.41	.31	2.30	481.03	.42	1.36	986.82	.45	5.5
Variola	.42	......	.42	.21	......	......	.50	......	.2
Rheumatic fever	6.99	.10	.10	3.97	......	......	9.22	.25	......
Tuberculosis of the lungs	2.82	.42	......	2.30	1.15	.21	2.92	1.34	.5
Syphilis	10.12	......	......	11.71	......	......	11.45	......	.1
Gonorrhea	45.07	......	......	72.46	......	......	44.85	.05	......
All venereal diseases	82.11	......	......	113.12	......	......	81.19	.05	.1
Alcoholism and direct results	6.68	......	......	22.17	......	.10	18.34	......	.4
Neuralgia	13.04	.21	......	22.28	.10	......	15.46	.05	......
Tonsillitis	55.40	......	......	37.22	......	......	52.48	......	......
Colic and constipation	37.66	......	......	75.90	......	......	47.28	......	.0
Diarrheal diseases	283.15	......	1.15	398.42	.21	.42	333.99	.35	3.9
Diseases of the heart	4.59	.63	.73	6.17	.84	.10	5.75	1.19	.5
Coryza	3[illegible].52	......	......	39.83	......	......	27.31	......	......
Bronchitis	100.99	......	......	150.65	......	......	98.73	.10	......
Pneumonia	7.93	......	1.04	2.61	......	.63	5.06	.10	.9
Diseases of the kidneys	1.98	.10	.21	2.72	.10	.21	2.83	.20	.1
Rheumatism and myalgia	74.91	.94	.10	72.45	.84	......	80.93	1.49	......
Boils and abscesses	73.34	......	.10	51.85	......	.10	22.45	.05	......
Conjunctivitis	7.41	......	......	9.51	.10	......	5.25	......	......
All diseases of the eye	11.58	.10	......	12.86	.52	......	9.32	.25	......
Diseases of the ear	6.47	.42	......	8.26	.31	......	7.14	.40	.05
Contusions and sprains	143.14	.63	......	110.40	.10	.10	57.15	.15	......
Dislocations	1.88	.10	......	3.35	......	......	1.98	......	......
Fractures, not gunshot	9.70	.42	.21	7.21	.42	......	4.91	.10	.05
Wounds, not gunshot	41.21	......	.31	50.97	.10	......	26.66	.15	.05
Wounds, gunshot	35.99	1.25	5.11	5.54	.42	1.25	51.45	3.97	5.8
GROUPED.									
Infectious diseases, general and local	929.79	1.15	14.19	843.18	1.88	7.42	1,372.21	3.17	22.6
Local infections	272.51	......	2.09	278.92	.10	1.05	221.10	.55	4.01
Diseases of nutrition, general	1.98	......	......	2.51	.10	......	4.86	.20	.2
Diseases of the nervous system	40.69	1.36	.52	70.15	1.25	.52	57.19	.69	1.44
Diseases of the digestive system	477.41	......	1.56	666.49	.52	1.15	539.73	.89	5.45
Diseases of the circulatory system	5.01	.63	.73	8.15	.94	.10	8.03	1.29	.69
Diseases of the respiratory organs	154.83	.21	1.15	203.76	.21	.63	141.51	.40	1.19
Diseases of the genito-urinary system	12.41	.42	.21	12.54	.21	.21	13.23	.45	.2
Diseases of the lymphatic system and ductless glands	3.86	......	......	4.70	......	......	2.97	.05	......
Diseases of the muscles, bones, and joints	81.27	1.36	......	84.68	1.25	......	81.87	1.69	......
Diseases of the integument and subcutaneous connective tissue	97.03	......	.10	93.05	......	.10	42.92	.05	....
Diseases of the organs of special sense	18.57	.52	......	22.06	.84	......	17.30	.69	.05
Unclassified	17.42	......	.10	9.83	......	.10	29.29	......	.20
General injuries	11.16	......	.73	11.92	......	2.09	22.45	.25	1.29
Injuries to special parts	282.11	3.44	5.74	236.49	2.61	1.46	179.52	5.95	6.00
Total for diseases	1,840.27	5.64	18.57	2.021.12	7.21	10.25	2,311.10	9.57	32.02
Total for injuries	293.27	3.44	6.47	248.40	2.61	3.55	201.96	6.19	7.29
Total for all causes	2,133.54	9.08	25.04	2.269.52	9.83	13.80	2,513.06	15.76	39.31

TABLE II.—*Showing, for the various arms of the service, the admissions to sick report, discharges and deaths, in ratios per 1,000 of mean strength, for the year 1898*—Continued.

	Engineers.			Ordnance.			Signal Corps.		
Mean strength	595.			672.			126.		
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
SPECIAL.									
Measles	15.13			1.49			23.81		
Vaccinia	20.17			1.49					
Typhoid fever	21.85		5.04	7.44		1.49	158.72		15.87
Yellow fever	35.29						63.50		15.87
Malarial infections	292.44		6.72	99.70			587.30		
Variola									
Rheumatic fever	15.13			4.46			15.87		
Tuberculosis of the lungs	5.04	1.68				1.49			
Syphilis	8.40						7.94		
Gonorrhea	21.85			10.42			39.68		
All venereal diseases	36.98			16.37			47.62		
Alcoholism and direct results	28.57			19.35		1.49			
Neuralgia	18.49			28.27			7.94		
Tonsilitis	35.29			38.69					
Colic and constipation	45.38			32.74			15.87		
Diarrheal diseases	189.92		1.68	95.24			285.71		
Diseases of the heart	3.36								
Coryza	73.95			23.81					
Bronchitis	82.35			87.80		1.49	15.87		
Pneumonia	1.68			2.98			7.94		
Diseases of the kidneys	1.68		1.68	1.49		1.49	7.94	7.94	
Rheumatism and myalgia	62.18			138.40	1.49		47.62		
Boils and abscesses	36.78			11.90			15.87		
Conjunctivitis	3.36			4.46					
All diseases of the eye	3.36			10.42					
All diseases of the ear	6.72			10.42					
Contusions and sprains	99.16	1.68		66.97			15.87		
Dislocations				1.49					
Fractures, not gunshot	5.04		1.68	1.49	1.49				
Wounds, not gunshot	26.89			31.25		1.49			
Wounds, gunshot	1.68					4.46	7.94		
GROUPED.									
Infectious diseases, general and local	660.50	1.68	13.45	233.63	1.49	2.98	920.63		31.75
Local infections	166.39			163.70	1.49		55.56		
Diseases of nutrition, general	1.68			2.98			7.94		
Diseases of the nervous system	60.51			58.04		1.49	47.62		
Diseases of the digestive system	468.91		1.68	293.15	1.49	2.98	380.95		
Diseases of the circulatory system	5.04								
Diseases of the respiratory organs	163.03			122.03		1.94	23.81		
Diseases of the genito-urinary system	3.36		1.68	7.44	1.49	1.49	15.87	7.94	
Diseases of the lymphatic system and ductless glands	3.36			1.49			7.94		
Diseases of the muscles, bones, and joints	60.51			145.84	1.49		31.75		
Diseases of the integument and subcutaneous connective tissue	67.23			31.25			15.87		
Diseases of the organs of special sense	11.76			20.83					
Unclassified	5.04						15.87		
General injuries	23.53		6.72	5.95					
Injuries to special parts	157.98	1.68	1.68	138.40	1.49	5.95	47.62		
Total for diseases	1,510.92	1.68	16.81	916.67	5.95	10.42	1,468.25	7.94	31.75
Total for injuries	181.51	1.68	8.40	144.35	1.49	5.95	47.62		
Total for all causes	1,692.44	3.36	25.21	1,061.01	7.44	16.37	1,515.87	7.94	31.75

TABLE II.—*Showing, for the various arms of the service, the admissions to sick report, discharges and deaths, in ratios per 1,000 of mean strength, for the year 1898*—Continued.

	Medical.			All others.			Army.			
Mean strength	3,738.			2,176.			46,635.			
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Constantly non-effective.
SPECIAL.										
Measles	17.92	......	......	1.84	......	......	25.09	......	0.26	1.70
Vaccinia	6.15	......	......	14.70	......	......	57.49	......	......	.79
Typhoid fever	193.41	0.27	16.32	6.43	......	0.46	88.56	0.41	9.74	11.17
Yellow fever	7.49	......	.54	2.30	......	......	12.95	......	1.50	.90
Malarial infections	377.72	......	.27	67.07	......	......	694.64	.31	3.24	31.70
Variola	.80	......	......	......	......	......	.40	......	.15	.01
Rheumatic fever	4.82	......	......	2.30	......	......	7.03	.13	.02	.61
Tuberculosis of the lungs	4.55	1.07	......	.46	......	......	2.77	1.01	.30	.48
Syphilis	5.08	......	......	2.30	......	......	10.08	......	.06	.72
Gonorrhea	23.54	......	......	10.10	......	......	46.42	.02	......	1.96
All venereal diseases	40.66	......	......	13.32	......	......	79.92	.02	.06	3.47
Alcoholism and direct results	7.22	......	......	1.84	......	......	15.16	......	.21	.21
Neuralgia	9.10	......	......	2.30	......	......	15.44	.09	......	.38
Tonsillitis	18.19	......	......	11.02	......	......	44.71	......	......	.48
Colic and constipation	12.57	......	......	2.30	......	......	45.97	......	.02	.34
Diarrheal diseases	171.21	.54	1.34	22.51	......	......	303.76	.24	2.14	3.96
Diseases of the heart	4.01	.80	......	1.38	......	.46	5.12	.88	.45	.49
Coryza	8.29	......	......	1.84	......	......	29.53	......	......	.20
Bronchitis	33.71	......	......	26.18	......	......	100.65	.04	.02	1.13
Pneumonia	5.08	......	.80	......	......	......	4.85	.04	.84	.40
Diseases of the kidneys	1.61	.54	.27	.46	......	......	2.40	.19	.21	.14
Rheumatism and myalgia	47.62	.27	......	18.83	......	......	72.88	1.05	.02	2.73
Boils and abscesses	5.08	......	......	4.13	......	......	36.71	.02	.04	.49
Conjunctivitis	2.94	......	......	1.84	......	......	6.18	.02	......	.14
All diseases of the eye	5.35	......	......	2.30	......	......	9.78	.24	......	.42
All diseases of the ear	5.08	.54	......	2.30	......	......	6.86	.36	.02	.32
Contusions and sprains	12.84	.27	......	23.89	......	......	81.20	.26	.02	1.38
Dislocations	1.07	......	......	......	......	......	2.04	.02	......	.08
Fractures, not gunshot	4.01	.27	......	1.84	0.46	......	6.09	.28	.09	.48
Wounds, not gunshot	5.35	......	......	7.35	......	......	32.01	.09	.11	.64
Wounds, gunshot	3.48	......	.27	2.76	......	.92	31.24	2.06	3.94	9.05
GROUPED.										
Infectious diseases, general and local	715.62	1.34	18.19	119.89	......	.46	1,034.97	2.14	15.99	51.90
Local infections	96.84	.80	1.87	46.85	......	.46	223.45	.34	2.55	4.14
Diseases of nutrition, general	4.01	.27	......	1.38	......	......	3.49	.13	.09	.21
Diseases of the nervous system	37.99	.27	.80	11.48	......	......	52.81	.86	.92	1.33
Diseases of the digestive system	286.52	.80	1.60	67.99	......	......	505.71	.58	3.11	7.01
Diseases of the circulatory system	5.35	1.07	......	1.38	......	.46	6.73	.96	.49	.60
Diseases of the respiratory organs	55.11	......	.80	28.94	......	......	144.50	.26	.96	2.04
Diseases of the genito-urinary system	7.76	.80	.27	2.30	......	......	11.77	.43	.24	.67
Diseases of the lymphatic system and ductless glands	1.07	......	......	......	......	......	3.22	.02	......	.17
Diseases of the muscles, bones, and joints	50.02	.54	......	18.83	......	......	77.34	1.33	......	2.70
Diseases of the integument and subcutaneous connective tissue	13.64	.27	......	11.48	......	......	60.57	.04	.04	1.06
Diseases of the organs of special sense	10.97	.54	......	5.05	......	......	17.39	.62	.02	.79
Unclassified	7.76	.27	......	3.67	......	......	19.17	.02	.13	.59
General injuries	4.55	......	.54	1.38	......	.46	15.27	.11	1.29	.70
Injuries to special parts	45.47	2.14	.54	43.64	.92	.92	193.96	4.07	4.27	13.04
Total for diseases	1,195.82	6.15	21.67	272.39	......	.92	1,937.71	7.40	22.00	69.09
Total for injuries	50.02	2.14	1.07	45.02	.92	1.38	209.23	4.18	5.55	13.74
Total for all causes	1,245.85	8.29	22.74	317.41	.92	2.30	2,146.94	11.58	27.55	82.83

TABLE III.—*Showing admissions to sick report, discharges, and deaths, in ratios per 1,000 of mean strength, for the year 1898, in the Islands and in the United States.*

	Cuba.			Puerto Rico.			Pacific islands.			Total Islands.			Total United States.		
Mean strength	3,810.			1,930.			2,903.			8,643.			37,992.		
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
SPECIAL.															
Measles	60.11		0.52	15.54		0.52	54.43		0.34	48.25		0.46	19.82		0.21
Vaccinia	5.25						42.37			16.55			66.83		
Typhoid fever	58.01		14.17	240.41		22.80	68.21	0.34	7.58	102.18	0.12	13.88	85.46	0.47	8.79
Yellow fever	151.18		17.57							66.64		7.75	.74		.08
Malarial infections	1,174.54		13.12	909.33	0.52	5.70	429.56	.34	1.72	865.10	.23	7.64	655.82	.37	2.24
Variola				1.04		.52	5.51		2.07	2.08		.81	.03		
Rheumatic fever	4.72			9.33			17.22	.34		9.95	.12		6.37	.13	.03
Tuberculosis of the lungs	2.10			5.18	.52	.52	4.48	3.10		3.59	1.16	.12	2.58	.97	.34
Syphilis	4.20		.52	16.58			5.51		.34	7.40		.35	10.69		
Gonorrhea	9.97			54.40			36.86			28.93			50.40	.03	
All venereal diseases	20.47		.52	125.91			106.78		.34	73.01		.35	81.49	.03	
Alcoholism and direct results	.52			18.65		2.07	21.70		.34	11.69		.58	15.95		.13
Neuralgia	13.65			23.32			19.29			17.70			14.92	.11	
Tonsillitis	2.89			5.18			19.98			9.14			52.80		
Colic and constipation	26.25			58.03			47.54			40.50			47.22		.03
Diarrheal diseases	314.17		9.97	1,200.00	1.04	2.07	431.97	1.03	1.72	551.54	.58	5.44	247.39	.16	1.39
Diseases of the heart	2.62		.26	7.25	.52	1.04	8.96	.69	.34	5.79	.35	.46	4.97	1.00	.45
Coryza	1.57			67.36			25.15			24.18			30.74		
Bronchitis	17.85			26.43			59.24			33.67			115.89	.05	.03
Pneumonia	2.36		.26	2.07		.52	4.82		.69	3.12		.46	5.24	.05	.92
Diseases of the kidneys	1.31			4.66			1.38			2.08			2.47	.24	.26
Rheumatism and myalgia	35.17			96.38			103.69	2.41		71.86	.81		73.11	1.11	.03
Boils and abscesses	7.09			44.04			42.03			27.08			38.90	.03	.05
Conjunctivitis	2.10			6.22			2.07			3.01			6.90	.03	
All diseases of the eye	3.41			7.25			8.61	.34		6.02	.12		10.63	.26	
All diseases of the ear	2.62			9.33			23.08	1.72		10.99	.58		5.92	.32	.03
Contusions and sprains	21.00			49.23			40.30			33.79			91.99	.32	.03
Dislocations	.52			4.15			2.76			2.08			2.03	.03	
Fractures, not gunshot	1.57			8.81			3.79			3.93			6.58	.34	.11
Wounds, not gunshot	9.71			19.17			25.84	.34		17.24	.12		35.38	.08	.13
Wounds, gunshot	289.24		33.33	10.36		1.04	10.33		3.10	133.29		15.97	8.03	2.53	1.21

TABLE III.—*Showing admissions to sick report, discharges, and deaths, in ratios per 1,000 of mean strength, for the year 1898, in the Islands and in the United States*—Continued.

	Cuba.			Puerto Rico.			Pacific islands.			Total Islands.			Total United States.		
Mean strength	3,810.			1,930.			2,903.			8,643.			37,992.		
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
GROUPED.															
Infectious diseases, general and local	1,595.54	....	45.93	1,345.08	1.04	30.05	837.07	4.13	12.74	1,284.86	1.62	31.24	978.14	2.26	12.53
Local infections	101.83	....	7.35	158.03	....	2.07	203.26	.34	2.07	148.45	.12	4.40	240.53	.39	2.13
Diseases of nutrition, general	3.67	....	.79	2.59	....	....	4.13	....	....	3.59	....	.35	3.47	.16	.03
Diseases of the nervous system	28.61	....	2.10	72.03	.52	2.59	65.79	.69	2.07	50.79	.35	2.20	53.27	.97	.63
Diseases of the digestive system	420.73	....	11.81	1,392.23	1.04	3.63	650.02	1.03	2.76	714.68	.58	6.94	458.18	.58	2.23
Diseases of the circulatory system	3.67	....	.26	11.92	.52	1.55	11.02	.69	.34	7.98	.35	.58	6.45	1.11	.47
Diseases of the respiratory organs	24.41	....	.26	103.81	1.04	1.04	106.44	....	.69	70.81	.23	.58	161.27	.26	1.05
Diseases of the genito-urinary system	4.99	....	....	22.80	....	....	15.16	....	....	12.38	....	....	11.63	.53	.29
Diseases of the lymphatic system and ductless glands	2.10	....	....	7.77	....	....	4.82	....	....	4.28	....	....	2.97	.03	....
Diseases of the muscles, bones, and joints	32.55	....	....	96.38	....	....	100.93	2.07	....	69.77	.69	....	79.06	1.47	....
Diseases of the integument and subcutaneous connective tissue	16.27	....	....	67.36	....	....	84.05	....	....	50.45	....	....	62.88	.05	.05
Diseases of the organs of special sense	6.30	....	....	16.58	....	....	32.38	2.07	....	17.35	.69	....	17.40	.61	.03
Unclassified	91.34	....	....	61.15	....	.52	2.41	....	....	54.73	....	.12	11.08	.03	.13
General injuries	61.42	....	3.67	12.95	....	1.04	16.19	....	.69	35.40	....	2.08	10.69	.13	1.11
Injuries to special parts	340.16	....	33.33	133.16	2.59	1.04	140.20	.69	3.44	226.77	.81	16.08	186.51	4.82	1.58
Total for diseases	2,230.18	....	61.15	3,204.66	4.15	39.38	1,914.23	10.68	18.60	2,341.66	4.51	42.01	1,845.81	8.05	17.45
Total for injuries	401.57	....	37.01	146.11	2.59	2.07	156.39	.69	4.13	262.18	.81	18.16	197.20	4.95	2.69
Total for all causes	2,631.76	....	98.16	3,350.78	6.74	41.45	2,070.62	11.37	22.74	2,603.84	5.32	60.17	2,043.01	13.00	20.14

TABLE IV.—*Ratios of admission to sick report, discharge, death, and constantly noneffective of the Army for the year 1898, as compared with the ratios of the Army for the decade 1887–1896 and for the year 1897.*

FOR THE DECADE 1887-1896.

	White.				Colored.				Indian.				Total.			
Mean strength	A. G., 24,425.		S. G., 22,230.		A. G., 2,364.		S. G., 2,184.		A. G., 227.		S. G., 213.		A. G., 27,016.		S. G., 24,627.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.[1]	Discharges.[1]	Deaths.[1]	Constantly non-effective.[1]	Admissions.	Discharges.	Deaths.	Constantly non-effective.
SPECIAL.																
Vaccinia	34.79	0.004	------	1.01	25.32	------	------	0.70	106.25	------	------	4.14	34.57	0.004	------	1.01
Typhoid fever	5.93	.01	0.61	.90	2.43	------	0.47	.32	.47	------	------	.02	5.58	.01	0.59	.84
Malarial infections	93.46	.07	.11	2.40	54.99	0.04	.38	1.62	32.91	------	------	.47	89.54	.07	.13	2.32
Rheumatic fever	5.21	.07	.01	.57	5.04	------	------	.50	4.23	0.44	------	.58	5.19	.06	.01	.56
Tuberculosis of the lungs	2.75	1.43	.41	.66	3.98	1.99	.89	.94	25.39	11.44	7.04	3.55	3.05	1.56	.51	.71
Syphilis	16.42	1.65	.02	1.63	18.73	3.05	.04	1.86	15.51	2.64	------	1.76	16.61	1.78	.03	1.66
Gonorrhea	40.79	.25	------	2.38	33.15	.04	------	1.55	63	------	------	3.17	40.31	.23	------	2.31
All venereal diseases	76.69	1.95	.02	5.26	77.15	3.09	.04	5	98.26	2.64	------	5.77	76.92	2.05	.03	5.24
Alcoholism and direct results	40.35	.06	.25	.47	4.99	.04	------	.05	4.70	------	------	.07	36.90	.06	.22	.43
Neuralgia	22.55	.15	------	.59	33.06	.04	------	.53	15.05	------	------	.17	23.42	.14	------	.58
Tonsillitis	41.24	.004	.01	.65	52.56	------	------	.73	29.62	------	------	.41	42.14	.004	.01	.66
Colic and constipation	30.88	.02	------	.28	44.79	.04	------	.39	31.50	------	------	.34	32.12	.02	------	.29
Diarrheal diseases	109.44	.17	.09	1.28	89.15	.17	.13	1.06	45.61	------	------	.55	107.09	.17	.10	1.25
Diseases of the heart	5.42	1.27	.39	.53	4.53	1.18	.34	.29	2.35	.88	.44	.16	5.32	1.26	.39	.51
Coryza	27.37	------	------	.28	29.17	------	------	.28	12.69	------	------	.11	27.41	------	------	.28
Bronchitis	70.02	.23	.02	1.33	69.05	.17	------	1.16	56.89	------	------	.82	69.82	.23	.02	1.31
Pneumonia	3.82	.04	.63	.39	7.01	.08	1.44	.58	10.34	------	.88	.70	4.16	.04	.71	.41
Diseases of the kidneys	1.68	.18	.23	.21	2.52	.25	.34	.21	------	------	------	------	1.74	.19	.24	.21
Rheumatism and myalgia	71.50	1.51	.02	3.52	108.43	1.78	------	4.34	50.78	1.32	------	1.54	74.60	1.53	.02	3.58
Boils and abscesses	44.19	.01	.004	.97	25.74	.04	------	.67	42.31	------	------	1.21	42.54	.01	.004	.95
Conjunctivitis	11.36	.05	------	.31	14.38	.17	------	.44	44.67	------	------	1.21	11.91	.06	------	.33
All diseases of the eye	17.54	.93	------	.75	26.70	1.02	------	1	62.06	.44	------	1.98	18.74	.93	------	.79
All diseases of the ear	7.52	.53	.004	.34	3.66	.17	------	.16	8.46	------	.44	.16	7.19	.50	.01	.29
Contusions and sprains	132.82	.23	.01	3.33	145.15	.21	.04	3.23	128.82	------	------	3.02	133.88	.23	.01	3.32
Dislocations	2.73	.10	.004	.20	1.83	.13	------	.10	6.11	------	------	.52	2.68	.10	.004	.20
Fractures, not gunshot	7.14	.51	.12	1.20	5.40	.34	.13	.91	11.75	------	1.76	1.52	7.02	.49	.13	1.18
Wounds, not gunshot	50.53	.21	.05	1.46	66.67	.25	.08	1.93	91.20	------	------	2.10	52.31	.21	.05	1.51
Wounds, gunshot	3.11	.60	.91	.55	6.36	.72	1.48	.88	7.05	.88	4.84	1.05	3.43	.61	1	.58

[1] For 1891–1894, four years of decade.

TABLE IV.—*Ratios of admission to sick report, discharge, death, and constantly noneffective, etc.*—Continued.

FOR THE DECADE 1887-1896.

	White.				Colored.				Indian.				Total.			
Mean strength	A. G., 24,425.		S. G., 22,230.		A. G., 2,364.		S. G., 2,184.		A. G., 227.		S. G., 213.		A. G., 27,016.		S. G., 24,627.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.
GROUPED.																
Infectious diseases, general and local	306.69	3.67	1.65	12.96	269.69	5.50	2.41	11.09	350.26	15.41	7.04	17.45	303.78	3.93	1.76	12.84
Diseases of nutrition, general	2.54	.53	.08	.23	2.01	.38	.04	.17	1.41	......	.44	.03	2.49	.51	.08	.22
Diseases of the nervous system	90.40	2.88	.77	2.27	68.04	1.95	.47	1.53	41.38	1.32	.44	.68	88.00	2.79	.74	2.19
Diseases of the digestive system	271.47	.68	.59	4.29	283.79	.76	.47	3.98	180.54	......	......	2.57	271.78	.68	.58	4.24
Diseases of the circulatory system	6.76	1.60	.47	.68	4.94	1.27	.55	.35	2.35	.88	.44	.16	6.56	1.57	.48	.65
Diseases of the respiratory organs	108.50	.55	.74	2.40	116.94	.34	1.69	2.46	92.15	1.32	.88	2.46	109.10	.54	.83	2.41
Diseases of the genito-urinary system	10.96	.75	.24	.83	13.92	.85	.34	.91	7.99	.44	......	.21	11.19	.75	.25	.83
Diseases of the lymphatic system and ductless glands	5	.06	.004	.43	6.32	......	......	.44	11.28	......	......	.93	5.17	.06	.004	.43
Diseases of the muscles, bones, and joints	77.03	2.46	.01	3.62	113.88	2.83	.04	4.64	53.60	1.76	......	1.38	80.09	2.49	.01	3.69
Diseases of the integument and subcutaneous connective tissue	80.19	.21	.02	2.07	48.72	.21	.08	1.52	71.93	......	......	2.19	77.33	.21	.02	2.03
Diseases of the organs of special sense	27.04	1.58	.01	1.23	31.55	1.31	......	1.21	72.40	.44	.44	2.19	27.83	1.54	.01	1.24
Unclassified	2.71	......	.004	.07	5.04	......	......	.09	2.82	......	......	.01	2.92	......	.004	.07
General injuries	3.80	.02	.96	.08	2.11	.04	.51	.04	......	......	.44	......	3.61	.02	.91	.07
Injuries to special parts	249.94	3.24	1.21	8.47	285.44	3.17	1.86	9.14	302.30	2.64	6.60	9.76	253.55	3.23	1.31	8.55
Total for diseases	989.27	14.97	4.59	31.10	964.84	15.40	6.09	28.38	888.11	21.57	9.68	30.27	986.23	15.07	4.77	30.85
Total for injuries	253.74	3.26	2.17	8.55	287.54	3.22	2.37	9.18	302.30	2.64	7.04	9.76	257.16	3.25	2.22	8.62
Total for all causes	1,243.02	18.24	6.76	39.65	1,252.38	18.62	8.46	37.56	1,190.41	24.21	16.73	40.03	1,243.39	18.32	6.99	39.46

TABLE IV.—Rates of admissions to sick report, discharge, death, and constantly noneffective, etc.—Continued.

FOR THE YEAR 1897.

Mean strength	White.				Colored.				Total.			
	A. G., 25.165.		S. G., 23.253.		A. G., 2,209.		S. G., 2,164.		A. G., 27.374.		S. G., 25.417.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.
SPECIAL.												
Vaccinia	28.60	......	......	0.64	24.95	......	......	0.45	28.29	......	......	0.62
Typhoid fever	5.55	......	0.28	.88	13.86	......	0.91	1.70	6.26	......	0.33	.95
Malarial infections	85.79	0.04	.04	1.78	4.62	......	......	.12	78.88	0.04	.04	1.63
Rheumatic fever	4.04	......	......	.45	7.86	......	......	.75	4.37	......	......	.47
Tuberculosis of the lungs	1.94	1.15	.28	.59	2.31	0.91	.91	.60	1.97	1.13	.33	.59
Syphilis	11.01	......	......	1.13	23.11	......	......	1.99	12.04	......	......	1.20
Gonorrhea	51.99	......	......	3.20	53.14	.45	......	2.67	52.09	.04	......	3.15
All venereal diseases	81.80	......	......	5.53	114.60	.45	......	6.88	84.59	.04	......	5.65
Alcoholism and direct results	30.02	......	.08	.43	4.62	......	......	.03	27.86	......	.07	.39
Neuralgia	16.30	.04	......	.34	14.79	......	......	.15	16.17	.04	......	.33
Tonsillitis	41.11	......	......	.62	46.21	......	......	.67	41.55	......	......	.62
Colic and constipation	30.32	......	......	.31	61.46	......	......	.38	32.97	......	......	.31
Diarrheal diseases	75.78	.12	......	.75	52.22	......	......	.33	73.77	.11	......	.71
Diseases of the heart	3.27	.76	.32	.31	1.85	.45	.45	.07	3.15	.73	.33	.29
Coryza	9.03	......	......	.08	8.78	......	......	.08	9.01	......	......	.08
Bronchitis	55.99	.20	......	.99	99.81	......	......	.87	59.72	.18	......	.98
Pneumonia	2.92	.08	.24	.32	6.01	......	......	.60	3.19	.07	.22	.35
Diseases of the kidneys	2.11	.28	.20	.30	1.85	......	......	.28	2.09	.26	.18	.30
Rheumatism and myalgia	61.80	.91	......	2.55	100.74	.91	......	3.46	65.12	.91	......	2.63
Boils and abscesses	44.00	......	......	.91	20.79	......	......	.42	42.02	......	......	.87
Conjunctivitis	9.76	......	......	.19	16.17	......	......	.23	10.31	......	......	.19
All diseases of the eye	15.09	.28	......	.51	29.11	......	......	1.05	16.29	.26	......	.56
All diseases of the ear	7.18	.20	.04	.30	1.39	.45	......	.08	6.69	.22	.04	.28
Contusions and sprains	152.58	.28	......	3.67	138.64	......	......	3.12	151.40	.26	......	3.62
Dislocations	3.44	......	......	.19	2.77	......	......	.11	3.38	......	......	.19
Fractures, not gunshot	8.13	.20	.16	1.18	7.86	......	......	1.30	8.10	.18	.15	1.19
Wounds, not gunshot	49.24	.20	......	1.31	54.53	......	......	1.59	49.69	.18	......	1.33
Wounds, gunshot	2.24	.24	.48	.36	4.62	......	3.17	.33	2.44	.22	.69	.36

TABLE IV.—*Ratios of admissions to sick report, discharge, death, and constantly noneffective, etc.*—Continued.

FOR THE YEAR 1897.

	White.				Colored.				Total.			
Mean strength	A. G., 25,165.		S. G., 23,253.		A. G., 2,209.		S. G., 2,164.		A. G., 27,374.		S. G., 25,417.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.	Admissions.	Discharges.	Deaths.	Constantly non-effective.
GROUPED.												
Infectious diseases, general and local	328.17	1.27	1.31	12.51	314.23	1.36	1.81	13.50	326.99	1.28	1.35	12.59
Local infections (also entered under diseases of organs)	156.84	.40	.52	3.60	191.31		.45	3.31	159.78	.37	.51	3.57
Diseases of nutrition, general	2.19	.24		.20	.46	.91		.06	2.05	.29		.19
Diseases of the nervous system	59.69	1.75	.36	1.69	27.27	2.26		.96	56.94	1.79	.33	1.63
Diseases of the digestive system	240.32	.60	.56	3.75	284.19		.45	3.79	244.05	.55	.55	3.75
Diseases of the circulatory system	4.82	.99	.36	.44	3.23	.45	.45	.08	4.68	.95	.37	.41
Diseases of the respiratory organs	73.41	.40	.24	1.61	124.30	.45		1.88	77.74	.40	.22	1.64
Diseases of the genito-urinary system	9.12	.48	.24	.78	16.64			1.03	9.76	.44	.22	.80
Diseases of the lymphatic system and ductless glands	2.28		.04	.17	3.23			.13	2.36		.04	.17
Diseases of the muscles, bones, and joints	68.77	1.27		2.74	112.74	1.81		4.06	72.52	1.31		2.85
Diseases of the integument and subcutaneous connective tissue	75.69			1.78	38.82			.81	72.55			1.70
Diseases of the organs of special sense	23.78	.60	.09	.88	31.88	.45		1.28	24.47	.58	.04	.92
Unclassified	2.54		.04	.09	1.39			.03	2.44		.04	.09
General injuries	8.94	.08	1.11	.18	5.54			.16	8.66	.07	1.02	.18
Injuries to special parts	281.13	1.95	.76	8.89	284.66	1.81	3.17	9.47	281.42	1.94	.95	8.94
Total for diseases	890.77	7.59	3.18	26.65	958.41	7.70	2.72	27.61	896.53	7.60	3.14	26.73
Total for injuries	290.07	2.03	1.87	9.07	290.20	1.81	3.17	9.63	290.08	2.01	1.97	9.12
Total for all causes	1,180.84	9.62	5.05	35.72	1,248.61	9.51	5.89	37.24	1,186.61	9.61	5.11	35.85

TABLE IV.—*Ratios of admission to sick report, discharge, death, and constantly noneffective, etc.*—Continued.

FOR THE YEAR 1898.

	White.			Colored.			Total.			
Mean strength	A. G., 43,307.			A. G., 3,328.			A. G., 46,635.			
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Constantly noneffective.
SPECIAL.										
Measles	25.91	......	0.28	14.42	......	......	25.09	......	0.26	1.70
Vaccinia	58.70	......	......	42.37	......	......	57.49	......	......	.79
Typhoid fever	93.24	0.44	10.00	27.64	......	6.31	88.56	0.41	9.74	11.17
Yellow fever	9.40	......	1.04	59.19	......	7.51	12.95	......	1.50	.90
Malarial infections	683.84	.37	3.16	834.73	......	4.21	694.64	.34	3.24	31.70
Variola	.44	......	.16	......	......	......	.40	......	.15	.01
Rheumatic fever	6.63	.09	......	12.32	0.60	.30	7.03	.13	.02	.61
Tuberculosis of the lungs	2.70	1.04	.32	3.61	.60	......	2.77	1.01	.30	.48
Syphilis	9.33	......	.07	19.83	......	......	10.08	......	.06	.72
Gonorrhea	44.86	.02	......	66.70	......	......	46.42	.02	......	1.96
All venereal diseases	76.90	.02	.07	119.29	......	......	79.92	.02	.06	3.47
Alcoholism and direct results	15.96	......	.23	4.81	......	......	15.16	......	.21	.21
Neuralgia	15.40	.09	......	15.93	......	......	15.44	.09	......	.38
Tonsillitis	35.98	......	......	158.35	......	......	44.71	......	......	.48
Colic and constipation	42.63	......	.02	89.54	......	......	45.97	......	.02	.34
Diarrheal diseases	312.72	.25	2.19	187.20	......	1.50	303.76	.24	2.14	3.96
Diseases of the heart	4.76	.85	.44	9.91	1.20	.60	5.12	.88	.45	.49
Coryza	31.38	......	......	5.41	......	......	29.53	......	......	.20
Bronchitis	95.71	.05	.02	164.96	......	......	100.65	.04	.02	1.13
Pneumonia	4.69	.05	.83	6.91	......	.90	4.85	.04	.84	.40
Diseases of the kidneys	2.29	.21	.21	3.91	......	.30	2.40	.19	.21	.14
Rheumatism and myalgia	68.28	.92	......	132.81	2.70	.30	72.88	1.05	.02	2.73
Boils and abscesses	38.03	......	.02	19.53	.30	.30	36.71	.02	.04	.49
Conjunctivitis	5.98	.02	......	8.71	......	......	6.18	.02	......	.14
All diseases of the eye	9.33	.25	......	15.62	......	......	9.78	.24	......	.42
All diseases of the ear	7.07	.37	.02	4.21	.30	......	6.86	.36	.02	.32
Contusions and sprains	81.28	.16	.02	80.23	1.50	......	81.20	.26	.02	1.38
Dislocations	2.06	......	......	1.80	.30	......	2.04	.02	......	.08
Fractures, not gunshot	6.17	.25	.07	5.11	.60	.30	6.09	.28	.09	.48
Wounds, not gunshot	31.26	.09	.09	41.76	......	.30	32.01	.09	.11	.64
Wounds, gunshot	27.71	2.12	3.74	77.22	1.20	6.61	31.24	2.06	3.94	9.05

TABLE IV.—*Ratios of admission to sick report, discharge, death, and canstantly noneffective, etc.*—Continued.

FOR THE YEAR 1898.

	White.			Colored.			Total.			
Mean strength	A. G., 43,307.			A. G., 3,328.			A. G., 46,635.			
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Constantly non-effective.
GROUPED.										
Infectious diseases, general and local	1,024.43	2.22	15.74	1,172.17	1.20	19.23	1,034.97	2.14	15.99	51.90
Local infections (also entered under diseases of organs)	210.98	.35	2.63	385.82	.30	1.50	223.45	.34	2.55	4.14
Diseases of nutrition, general	3.65	.14	.09	1.50	......	......	3.49	.13	.09	.21
Diseases of the nervous system	52.92	.81	.95	51.38	1.50	.60	52.81	.86	.92	1.33
Diseases of the digestive system	503.87	.62	3.17	529.75	......	2.40	505.71	.58	3.11	7.01
Diseases of the circulatory system	6.44	.95	.48	10.52	1.20	.60	6.73	.96	.49	.60
Diseases of the respiratory organs	140.97	.28	.92	190.50	......	1.50	144.50	.26	.96	2.04
Diseases of the genito-urinary system	11.13	.39	.23	20.13	.90	.30	11.77	.43	.24	.67
Diseases of the lymphatic system and ductless glands	3.21	.02	......	3.31	......	......	3.22	.02	......	.17
Diseases of the muscles, bones, and joints	72.83	1.25	......	136.12	2.40	......	77.34	1.33	......	2.70
Diseases of the integument and subcutaneous connective tissue	63.05	.02	.02	28.25	.30	.30	60.57	.04	.04	1.06
Diseases of the organs of special sense	17.13	.65	.02	20.73	.30	......	17.39	.62	.02	.79
Unclassified	20.37	.02	.14	3.61	......	......	19.17	.02	.13	.59
General injuries	15.86	.09	1.29	7.51	.30	1.20	15.27	.11	1.29	.70
Injuries to special parts	189.30	4.06	4.04	254.81	4.21	7.21	193.96	4.07	4.27	13.04
Total for diseases	1,920.01	7.37	21.78	2,167.97	7.81	24.94	1,937.71	7.40	22.00	69.09
Total for injuries	205.16	4.16	5.33	262.32	4.51	8.41	209.23	4.18	5.55	13.74
Total for all causes	2,125.17	11.53	27.11	2,430.29	12.32	33.35	2,146.94	11.58	27.55	82.83

TABLE V.—*Movement of sickness and mortality, by months, during the year 1898.*

[Ratios per thousand of mean strength.]

Month	January.			February.			March.			April.			May.			June.			July.		
Mean strength	27,576.			27,548.			28,183.			29,485.			38,816			47,867.			54,048.		
Diseases.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
SPECIAL.																					
Measles	0.83	......	......	0.65	......	......	1.60	......	......	0.88	......	......	1.08	......	......	5.58	......	0.02	4.74	......	0.06
Vaccinia	5.69	......	......	4.14	......	......	5	......	......	9.80	......	......	6.49	......	......	5.89	......	......	3.55	......	......
Typhoid fever	.33	......	0.04	.11	......	0.04	.14	......	......	.20	......	0.03	.49	......	0.08	2.21	......	.04	9.27	......	.59
Yellow fever	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	8.55	......	.46
Malarial infections	1.92	......	......	1.63	......	......	1.81	......	......	2.78	......	......	5	......	......	6.43	......	......	52.14	......	.20
Rheumatic fever	.73	......	.04	.47	......	......	.57	......	......	.58	......	......	.26	......	......	.25	0.02	......	.50	0.02	......
Tuberculosis of the lungs	.11	0.07	.07	.15	0.11	.04	.28	0.14	......	.03	0.14	.03	.05	......	......	.15	.04	......	.09	.04	......
Syphilis	1.27	......	......	1.05	......	......	1.10	......	......	.41	......	......	.39	......	......	.56	......	......	.48	......	.02
Gonorrhea	3.81	......	......	3.34	......	......	4.12	......	......	3.46	......	......	2.60	......	......	2.24	......	......	2.15	......	......
All venereal diseases	6.64	......	......	5.41	......	......	6.56	......	......	5.32	......	......	4.46	......	......	4.37	......	......	3.76	......	.02
Alcoholism and direct results	2.54	......	......	2	......	......	2.13	......	0.04	1.49	......	.03	.62	......	......	.48	......	......	.39	......	......
Neuralgia	1.41	......	......	1.16	......	......	1.28	......	......	1.19	.03	......	.86	......	......	.48	......	......	.44	......	......
Tonsillitis	6.60	......	......	5.88	......	......	5.50	......	......	3.39	......	......	2.16	......	......	1.38	......	......	.74	......	......
Colic and constipation	1.78	......	......	2.61	......	......	2.06	......	......	2.17	......	......	2.96	......	......	2.24	......	......	2.83	......	.02
Diarrheal diseases	2.14	......	......	1.38	......	......	1.77	......	......	7.19	......	......	32.23	......	.03	18.57	.02	.02	32.70	......	.13
Diseases of the heart	.29	......	.04	.15	......	.04	.35	.11	.07	.24	.14	......	.05	0.05	......	.08	.02	.04	.33	.07	.02
Coryza	.80	......	......	.44	......	......	.71	......	......	.75	......	......	.62	......	......	.79	......	......	.85	......	......
Bronchitis	7.83	.04	......	6.61	......	......	7.59	......	......	5.49	.03	......	3.76	......	......	2.19	......	......	2.16	......	......
Pneumonia	.22	......	......	.29	......	......	.35	......	.04	.24	......	......	.31	.03	.03	.29	......	.06	.24	......	.06
Diseases of the kidneys	.18	.04	.04	.04	.04	......	.28	.04	......	.10	.03	.03	.08	......	......	.06	......	......	.09	......	.02
Rheumatism and myalgia	5.98	.07	.04	4.47	.04	......	5.07	.11	......	4.48	.20	......	3.48	.03	......	2.38	.08	......	3.65	.02	......
Boils and abscesses	3.05	......	......	3.05	......	......	2.66	......	......	2.37	......	......	3.25	......	......	2.05	......	......	2.70	......	......
Conjunctivitis	.36	......	......	.36	......	......	.82	......	......	.85	......	......	.67	......	......	.38	......	......	.43	......	......
All diseases of the eye	.58	......	......	.94	......	......	1.06	......	......	.95	.03	......	.90	......	......	.63	.02	......	.56	......	......
All diseases of the ear	.33	......	......	.65	.04	......	.39	......	......	.20	.03	......	.54	......	......	.31	......	......	.44	.02	.02
Contusions and sprains	9.68	.04	......	11.40	......	......	11.99	.07	......	9.46	.07	......	5.87	.03	......	4.18	......	......	5.85	......	......
Dislocations	.15	......	......	.25	......	......	.32	......	......	.14	......	......	.18	......	......	.06	......	......	.22	......	......
Fractures, not gunshot	.58	.04	......	.65	.04	.07	.53	.11	......	.41	......	......	.36	.03	......	.58	......	......	.35	.02	......
Wounds, not gunshot	3.26	.04	......	2.94	......	......	3.58	......	......	3.02	......	.03	3.63	......	.03	2.05	......	......	2.50	......	.02
Wounds, gunshot	.29	.07	.11	.04	......	.04	.11	.11	.04	.17	.03	.03	.23	......	.03	.65	......	.17	22.94	.04	2.39

TABLE V.—*Movement of sickness and mortality, by months, during the year 1898*—Continued.

[Ratios per thousand of mean strength.]

Month	January.			February.			March.			April.			May.			June.			July.		
Mean strength	27,576.			27,548.			28,183.			29,485.			38,816.			47,867.			54,048.		
Diseases.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
GROUPED.																					
Infectious diseases, general and local	22.08	0.07	0.15	18.77	0.14	0.07	23.17	0.18	0.04	25.23	0.14	0.10	20.02	......	0.13	26.41	0.08	0.13	89.92	0.07	1.37
Local infections (also entered under diseases of organs)	18.64	.04	.04	16.15	.04	......	16.89	......	.04	11.97	......	......	11	0.08	.03	7.33	......	.15	9.27	......	.17
Diseases of nutrition, general	.18	.04	......	.18	......	......	.07	......	......	.10	.03	......	.05	.03	.03	......	.02	......	.13	.04	......
Diseases of the nervous system	4.79	.07	.04	3.85	.04	.04	4.51	.04	.07	3.29	.14	.07	2.52	.08	......	2.42	.04	.02	2.70	.02	.07
Diseases of the digestive system	17.70		.07	16.55	......	.04	15.36	......	......	18.55	.17	......	41.79	.05	.03	26.37	.02	.10	41.46	......	.24
Diseases of the circulatory system	.36	.04	.04	.22	......	.04	.50	.11	.07	.27	.14	......	.13	.08	......	.15	.02	.04	.35	.07	.02
Diseases of the respiratory organs	9.36	.04	......	8.06	......	......	9.26	.04	.04	6.82	.03	......	5.02	.03	.03	3.61	......	.06	3.57	......	.06
Diseases of the genito-urinary system	1.31	.04	.04	.91	.04	......	.89	.04	......	.58	.03	.03	.52	......	......	.31	......	......	.52	.04	.02
Diseases of the lymphatic system and ductless glands	.36	......	......	.18	......	......	.14	......	......	.10	......	......	.13	......	......	.13	......	......	.24	.02	......
Diseases of muscles, bones, and joints	5.95	.11	......	4.61	.14	......	5.25	.11	......	4.82	.20	......	3.81	.05	......	2.69	.08	......	3.66	.04	......
Diseases of the integument and subcutaneous connective tissue	4.75	......	......	4.61	......	......	4.93	......	......	4.00	......	......	5.20	......	......	3.78	......	......	4.90	......	......
Diseases of the organs of special sense	.91	......	......	1.67	.04	......	1.53	......	......	1.25	.07	......	1.47	......	......	.94	.02	......	1.05	.02	.02
Unclassified	.36	......	......	.07	......	......	.14	......	......	.10	......	.03	.23	......	......	1.44	......	......	1.63	......	.02
General injuries	.18	......	.04	.11	......	......	.39	......	.07	.27	......	.03	1.06	......	.05	1.73	.02	.19	4.46	......	.19
Injuries to special parts	18.57	.22	.11	18.66	.14	.11	20.19	.28	.04	16.38	.24	.07	13.27	.13	.05	9.80	......	.17	34.99	.11	2.44
Total for diseases	68.11	.40	.33	59.68	.40	.18	65.75	.50	.21	65.12	.95	.24	80.90	.31	.21	68.25	.29	.36	150.15	.31	1.81
Total for injuries	18.75	.22	.15	18.77	.14	.11	20.58	.28	.11	16.65	.24	.10	14.32	.13	.10	11.53	.02	.36	39.45	.11	2.63
Total for all causes	86.86	.62	.48	78.45	.54	.29	86.33	.78	.32	81.77	1.19	.34	95.22	.44	.31	79.78	.31	.72	189.60	.42	4.44

TABLE V.—*Movement of sickness and mortality, by months, during the year 1898*—Continued.

[Ratios per thousand of mean strength.]

Month	August.			September.			October.			November.			December.			Year 1898.		
Mean strength	56,362.			59,650.			60,636.			63,768.			65,681.			46,635.		
Diseases.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
SPECIAL.																		
Measles	3.03		0.07	1.24			0.46		0.02	0.63		0.03	2.74		0.02	25.09		0.26
Vaccinia	3.14			1.12			7.59			3.97			9.15			57.49		
Typhoid fever	25.19		2.71	19.58	0.02	2.53	8.91	0.20	1.07	3.65	0.09	.49	1.84		.21	88.56	0.41	9.74
Yellow fever	2.13		.71	.20		.05	.08		.03	.02			.06			12.95		1.50
Malarial infections	104.06		1.03	129.69	.02	1.06	86.71	.03	.23	76.72	.08	.03	77.52	0.12	.03	694.64	.34	3.24
Rheumatic fever	.60			.55			.68	.02		.75	.02		.87	.03		7.03	.13	.02
Tuberculosis of the lungs	.34	0.12	.02	.45	.07	.03	.35	.05	.02	.25	.14	.03	.24	.11	.06	2.77	1.01	.30
Syphilis	.76		.04	1.01			76			1.08			1.17			10.08		.06
Gonorrhea	3.42			3.44			4.82	.02		6.13			5.22			46.42	.02	
All venereal diseases	5.11		.04	6.02			8.39	.02		10.60			9.68			79.92	.02	.06
Alcoholism and direct results	.60		.04	1.44		.02	1.45		.05	1.40		.02	1.72		.02	15.16		.21
Neuralgia	1.06			1.74	.02		2.03			1.63	.02		1.63	.02		15.44	.09	
Tonsillitis	1.26			1.98			2.36			5.57			9.27			44.71		
Colic and constipation	4.72			5.13			4.78			4.66			5.59			45.97		.02
Diarrheal diseases	54.36	.02	.80	47.69	.03	.39	27.82	.02	.28	17.74	.03	.06	17.86	.06	.03	303.76	.24	2.14
Diseases of the heart	.55	.02	.04	.52	.03	.08	.82	.05	.03	.55	.22	.05	.59	.11	.03	5.12	.88	.45
Coryza	1.12			1.24			2.77			5.08			8.59			29.53		
Bronchitis	4.29			6.35			10.01			14.54		.02	21.27			100.65	.04	.02
Pneumonia	.30		.07	.49		.18	.58	.02	.07	.50		.09	.65		.09	4.85	.04	.84
Diseases of the kidneys	.34	.02	.07	.39	.03	.02	.21		.02	.33	.03		.12		.02	2.40	.19	.21
Rheumatism and myalgia	5.94	.04		8.33			8.94	.08		8.26	.16		7.44	.21		72.88	1.05	.02
Boils and abscesses	3.51		.02	3.69	.02		3.07			3.67			2.91		.02	36.71	.02	.04
Conjunctivitis	.55			.42			.41			.56			.54	.02		6.18	.02	
All diseases of the eye	.85	.02		.64			.74	.02		1.05	.03		.96	.08		9.78	.24	
All diseases of the ear	.64	.02		.85	.02		.66	.05		.67	.08		.70	.06		6.86	.36	.02
Contusions and sprains	4.77	.02		5.68	.02		5.31	.03		7.01	.02	.02	7.12	.02		81.20	.26	.02
Dislocations	.18			.18			.10			.11			.23	.02		2.04	.02	
Fractures, not gunshot	.43	.04		.55		.02	.64	.02		.53			.49	.05	.02	6.09	.28	.09
Wounds, not gunshot	2.22			1.98			2.52	.03		2.89		.02	2.71	.02	.02	32.01	.09	.11
Wounds gunshot	1.17	.02	.25	.23	.03	.07	.63	.21	.23	.24	.66	.06	.41	.46	.06	31.24	2.06	3.94

TABLE V.—*Movement of sickness and mortality, by months, during the year 1898*—Continued.

[Ratios per thousand of mean strength.]

Month	August.			September.			October.			November.			December.			Year 1898.		
Mean strength	56,362.			59,650.			60,636.			63,768.			65,681.			46.635.		
Diseases.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.
GROUPED.																		
Infectious diseases, general and local	147.92	0.14	4.63	164.48	0.10	3.79	112.46	0.38	1.43	100.11	0.35	0.69	114.05	0.27	0.50	1034.97	2.14	15.99
Local infections (also entered under diseases of organs)	17.01	.05	.73	18.22	.05	.54	19.54	.02	.20	26.96	......	.14	36.60	.06	.09	223.45	.34	2.55
Diseases of nutrition, general	.30	......	.05	.52	......	......	.45	......	......	.64	......	......	.35	......	......	3.49	.13	.09
Diseases of the nervous system	5.27	.02	.23	6.97	.03	.10	5.15	.08	.10	4.83	.14	.03	4.69	.14	.08	52.81	.86	.92
Diseases of the digestive system	70.98	.04	.92	71.25	.08	.52	48.56	.03	.40	39.09	.06	.17	43.34	.09	.08	505.71	.58	3.11
Diseases of the circulatory system	.71	.04	.05	.70	.03	.10	1.02	.07	.03	.75	.22	.05	.81	.11	.03	6.73	.96	.49
Diseases of the respiratory organs	6.30	.04	.09	9.04	.02	.20	14.42	.02	.08	21.34	.02	.11	32.08	.05	.12	144.50	.26	.96
Diseases of the genito-urinary system	1.14	.04	.07	1.73	.03	.02	1.09	.02	.02	1.22	.05	.02	1.10	.09	.02	11.77	.43	.24
Diseases of the lymphatic system and ductless glands	.21	......	......	.39	......	......	.33	......	......	.38	......	......	.38	......	......	3.22	.02	......
Diseases of muscles, bones, and joints	6.16	.05	......	8.75	.02	......	9.38	.13	......	9.27	.17	......	7.95	.23	......	77.34	1.33	......
Diseases of the integument and subcutaneous connective tissue	6.08	......	.02	5.41	.02	......	4.83	......	......	5.96	......	......	4.92	.02	.02	60.57	.04	.04
Diseases of the organs of special sense	1.51	.04	......	1.54	.02	......	1.53	.07	......	1.80	.11	......	1.77	.15	......	17.39	.62	.02
Unclassified	8.02	.02	.07	1.01	......	......	1.27	......	......	.64	......	......	1.20	......	......	19.17	.02	.13
General injuries	2.98	......	.27	1.26	......	.15	.59	.03	.05	.31	.02	.02	.32	.02	.11	15.27	.11	1.29
Injuries to special parts	12.22	.12	.28	12.15	.15	.08	12.40	.48	.23	14.91	.89	.09	14.86	.79	.11	193.96	4.07	4.27
Total for diseases	254.61	.41	6.14	271.79	.35	4.73	200.48	.79	2.06	186.06	1.11	1.07	212.63	1.14	.84	1937.71	7.40	22.00
Total for injuries	15.20	.12	.55	13.41	.15	23	13.00	.51	.28	15.23	.91	.11	15.18	.81	.21	209.23	4.18	5.55
Total for all causes	269.81	.53	6.69	285.20	.50	4.96	213.48	1.30	2.34	201.29	2.02	1.18	227.81	1.95	1.05	2146.94	11.58	27.55

TABLE VI.—*Deaths, United States Army, regulars and volunteers, May, 1898, to June, 1899, inclusive, with monthly ratios.*

Diseases, etc.	Total.		1898.															
			May.		June.		July.		August.		September.		October.		November.		December.	
	Deaths.	Ratio.	Deaths	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths	Ratio.
Anæmia	1	0.01																
Appendicitis	38	.22			5	0.02	7	0.03	7	0.03	7	0.03	3	0.01	2	0.01	1	0.01
Apoplexy	23	.13	1	0.01	1	.005	2	.01	5	.02	2	.01	1	.004	3	.02	2	.01
Alcoholism	35	.20	1	.01	1	.005	3	.01	1	.004	1	.004	4	.02	3	.02	3	.02
Cancer	10	.06					1	.004	1	.004	1	.004	2	.01	1	.01	1	.01
Cerebro-spinal fever	120	.70	5	.03	12	.06	12	.05	13	.05	8	.03	8	.03	11	.06	12	.07
Cerebral congestion	14	.08					3	.01	3	.01	2	.01	3	.01	1	.01		
Diphtheria	15	.09							3	.01	4	.01	1	.004	1	.01	1	.01
Meningitis and disease of brain	91	.53	1	.01	4	.02	7	.03	11	.04	15	.06	11	.05	9	.05	11	.07
Diarrhea and dysentery	342	1.99			2	.01	23	.09	96	.35	76	.28	46	.20	24	.13	12	.07
Enteritis	16	.09					3	.01			4	.01	3	.01	1	.01		
Epilepsy	2	.02											1	.004				
Exhaustion	13	.08							5	.02	6	.02	1	.004	1	.01		
Erysipelas	7	.04					1	.004							2	.01	1	.01
Gastritis	11	.06	1	.01					2	.01	1	.004	2	.01	4	.02		
Heart disease	68	.40	1	.01			4	.02	15	.06	12	.04	7	.03	7	.04	6	.04
Kidney disease	38	.22	3	.02	2	.01	1	.004	3	.01	3	.01	5	.02	1	.01	1	.01
Liver disease	24	.14			1	.005	1	.004	5	.02	7	.03	1	.004	2	.01	1	.01
Malarial fever and results	476	2.77			1	.005	27	.10	176	.65	140	.52	53	.24	16	.09	11	.07
Measles	22	.13					6	.02	4	.01	3	.01	1	.004	1	.01		
Peritonitis	48	.28					5	.02	5	.02	12	.04	5	.02	5	.03	3	.02
Phthisis	91	.53			3	.01	2	.01	7	.03	10	.04	7	.03	16	.09	17	.10
Pneumonia and results	359	2.09	15	.09	25	.12	30	.11	40	.15	44	.16	25	.11	38	.21	22	.13
Poisoning	15	.09					1	.004	3	.01	3	.01	4	.02	1	.01		
Pyæmia and septicæmia	24	.14	1	.01			5	.02	7	.03	2	.01	1	.004	2	.01	1	.01
Scarlet fever	5	.03							2	.01	1	.004	1	.004	1	.01		
Rheumatic fever	6	.03					1	.004	1	.004								
Smallpox	98	.57									1	.004	11	.05	6	.03	7	.04
Syphilis	3	.02					1	.004	1	.004							1	.01
Typhoid fever	2,774	16.15	2	.01	20	.10	203	.76	662	2.43	986	3.68	516	2.29	178	.99	53	.31
Yellow fever	185	1.08					47	.18	85	.31	19	.07	13	.06	3	.02	1	.01
Other diseases	171	1.00	11	.07	16	.08	10	.04	40	.15	25	.09	27	.12	7	.04	13	.08
Total from disease	5,145	29.96	42	.26	93	.45	406	1.53	1,203	4.41	1,395	5.20	763	3.39	347	1.94	181	1.07
Drowning	91	.53	4	.02	7	.03	4	.02	14	.05	8	.03	5	.02	2	.01	3	.02
Heat stroke	17	.10			1	.005	3	.01	10	.04	2	.01						
Homicide, suicide, and gunshot wounds	1,020	5.94	5	.03	27	.13	341	1.28	97	.36	44	.16	58	.26	20	.11	36	.21
Not reported and unknown	346	2.01	9	.06	14	.07	27	.10	123	.45	113	.42	34	.15	14	.08	4	.02
Total deaths, all causes	6,619		60		142		781		1,447		1,562		860		383		224	
Ratios, 14 months		38.54		.37		.68		2.94		5.31		5.82		3.82		2.14		1.32

TABLE VI.—*Deaths, United States Army, regulars and volunteers, May, 1898, to June, 1899, inclusive, with monthly ratios*—Continued.

Diseases, etc.	1899.											
	January.		February.		March.		April.		May.		June.	
	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.
Anæmia					1	0.01						
Appendicitis	1	0.01			1	.01	1	0.01	2	0.02	1	0.01
Apoplexy			2	0.02			2	.02	1	.01	1	.01
Alcoholism	7	.04	2	.02	2	.02	3	.03	4	.05		
Cancer					1	.01			2	.02		
Cerebro-spinal fever	20	.13	4	.03	5	.04	4	.04	4	.05	2	.02
Cerebral congestion			2	.02								
Diphtheria	3	.02							1	.01	1	.01
Meningitis and disease of brain	8	.05	4	.03	6	.05	1	.01	2	.02	1	.01
Diarrhea and dysentery	9	.06	14	.11	13	.11	8	.09	11	.14	8	.10
Enteritis			2	.02	1	.01			1	.01	1	.01
Epilepsy			1	.01								
Exhaustion												
Erysipelas							1	.01	1	.01	1	.01
Gastritis	1	.01										
Heart disease	5	.03	4	.03	3	.03	2	.02			2	.02
Kidney disease	3	.02	7	.05	3	.03	3	.03	1	.01	2	.02
Liver disease	1	.01	1	.01	2	.02			1	.01	1	.01
Malarial fever and results	6	.04	16	.12	12	.10	12	.13	5	.06	1	.01
Measles	1	.01	3	.02			3	.03				
Peritonitis	2	.01	4	.03	3	.03	3	.03	1	.01		
Phthisis	8	.05	5	.04	3	.03	6	.06	4	.05	3	.04
Pneumonia and results	35	.22	27	.21	25	.22	13	.14	11	.14	9	.11
Poisoning					1	.01	1	.01			1	.01
Pyæmia and septicæmia	1	.01					3	.03			1	.01
Scarlet fever												
Rheumatic fever	1	.01			2	.02					1	.01
Smallpox	22	.14	24	.18	14	.12	10	.11	2	.02	1	.01
Syphilis												
Typhoid fever	27	.17	24	.18	24	.21	27	.29	34	.42	18	.22
Yellow fever	2	.01			1	.01					14	.17
Other diseases	4	.03	1	.01	4	.04	1	.01	8	.10	4	.05
Total from disease	167	1.07	147	1.13	127	1.12	104	1.11	96	1.20	74	.92
Drowning	3	.02	6	.05	7	.06	12	.13	9	.11	7	.09
Heat stroke									1	.01		
Homicide, suicide, and gunshot wounds	23	.15	101	.78	110	.97	77	.82	28	.35	53	.66
Not reported and unknown	3	.02	1	.01	1	.01	1	.01	2	.02		
Total deaths, all causes	196		255		245		194		136		134	
Ratios, 14 months		1.26		1.97		2.16		2.07		1.69		1.67

TABLE VII.—*Deaths, United States Army, regulars and volunteers, May, 1898, to June, 1899, inclusive, with annual rates, for the United States and the Islands.*

Diseases, etc.	Total Army.		United States.						Cuba.		Puerto Rico.		Pacific islands.	
			Regulars.		Volunteers.		Total.							
	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.	Deaths.	Ratio.
Anæmia	1	0.005	1	0.02			1	0.007						
Appendicitis	38	.19	9	.19	23	0.22	32	.21	4	0.19	1	0.16	1	0.04
Apoplexy	23	.11	7	.15	5	.05	12	.08	5	.24	1	.16	5	.21
Alcoholism	35	.17	12	.26	9	.09	21	.14	9	.44	2	.32	3	.13
Cancer	10	.05	6	.13	4	.04	10	.07						
Cerebro-spinal fever	120	.59	32	.69	74	.71	106	.71	7	.34	1	.16	6	.26
Cerebral congestion	14	.07			7	.07	7	.05	5	.24	2	.32		
Diphtheria	15	.07	3	.06	4	.04	7	.05	3	.15			5	.21
Meningitis and disease of brain	91	.45	17	.37	38	.36	55	.37	22	1.07	3	.48	11	.47
Diarrhea and dysentery	342	1.71	66	1.42	88	.84	154	1.03	117	5.69	13	2.08	58	2.48
Enteritis	16	.08	3	.06	4	.04	7	.05	7	.34			2	.09
Epilepsy	2	.01							1	.05	1	.16		
Exhaustion	13	.06	4	.09	6	.06	10	.07	3	15				
Erysipelas	7	.03	1	.02	3	.03	4	.03					3	.13
Gastritis	11	.05	1	.02	3	.03	4	.03	3	.15	3	.48	1	.04
Heart disease	68	.34	13	.28	24	.23	37	.25	16	.78	8	1.28	7	.30
Kidney disease	38	.19	11	.24	13	.12	24	.16	8	.39			6	.26
Liver disease	24	.12	9	.19	7	.07	16	.11	5	.24	1	.16	2	.09
Malarial fever and results	476	2.38	87	1.87	135	1.30	222	1.48	222	10.80	17	2.73	15	.64
Measles	22	.11	6	.13	13	.12	19	.13	3	.15				
Peritonitis	48	.24	8	.17	26	.25	34	.23	10	.49	1	.16	3	.13
Phthisis	91	.45	23	.50	36	.35	59	.39	18	.88	5	.80	9	.39
Pneumonia and results	359	1.79	71	1.53	240	2.31	311	2.07	33	1.60	3	.48	12	.51
Poisoning	15	.07	6	.13	6	.06	12	.08	1	.05	1	.16	1	.04
Pyæmia and septicæmia	24	.12	4	.09	10	.10	14	.09	5	.24	2	.32	3	.13
Scarlet fever	5	.02	2	.04	2	.02	4	.03	1	.05				
Rheumatic fever	6	.03	3	.06			3	.02	3	.15				
Smallpox	98	.49	1	.02	1	.01	2	.01	4	.19	2	.32	90	3.85
Syphilis	3	.01	1	.02			1	.007	2	.10				
Typhoid fever	2,774	13.84	361	7.78	1,890	18.21	2,251	14.99	231	11.23	168	26.93	124	5.30
Yellow fever	185	.92	2	.04	4	.04	6	.04	178	8.66	1	.16		
Other diseases	171	.85	39	.84	93	.90	132	.88	2	.10	2	.32	35	1.50
Total from disease	5,145	25.68	809	17.43	2,768	26.67	3,577	23.81	928	45.14	238	38.15	402	17.20
Drowning	91	.45	14	.30	25	.24	39	.26	15	.73	2	.32	35	1.50
Heat stroke	17	.08	1	.02	3	.03	4	.03	10	.49	1	.16	2	.09
Homicide, suicide, and gunshot wounds	1,020	5.09	97	2.09	69	.66	166	1.11	429	20.86	45	7.21	380	16.26
Not reported and unknown	346	1.73	107	2.31	231	2.23	338	2.25	2	.10			6	.26
Total	6,619	33.03	1,028	22.15	3,096	29.83	4,124	27.46	1,384	67.32	286	45.84	825	35.31

TABLE VIII.—*Number of white and colored applicants for enlistment physical examined during the year 1898, with the number accepted, rejected on primar examination, and declined, with ratios per thousand.*

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 white examined.	Number.	Ratio per 1,000 colored examined.	ber.	Ratio per 1,000 exam ined.
Examined	66,237	1,000.00	5,013	1,000.00	71,250	1,000.
Accepted	51,055	770.79	3,841	766.21	54,896	770.
Rejected on primary examination	13,676	206.47	1,088	217.04	14,764	207.
Declined	1,506	22.74	84	16.75	1,590	22.

In addition to the foregoing, 40 Indians were examined, of whom all were enlisted as scouts.

TABLE IX.—*Nativity of white and colored recruits accepted during the year 189 with ratios per thousand accepted.*

Nativity.	White.		Colored.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio pe 1,000 ac-cepted.
United States	42,615	776.29	3,828	69.73	46,443	846.
England	871	15.87			871	15.8
Scotland	214	3.90			214	3.
Wales	71	1.29	1	0.02	72	1.
Ireland	1,907	34.74			1,907	34.7
Canada	574	10.46	2	.04	576	10.
Other British	89	1.62	1	.02	90	1.
France	48	.87			48	.
Belgium	15	.27			15	.
Holland	55	1			55	1
Denmark	197	3.59			197	3.
Norway	160	2.91			160	2.9
Sweden	418	7.62			418	7.
Germany	2,634	47.98			2,634	47.9
Switzerland	167	3.04			167	3.
Austria	311	5.67			311	5.
Bohemia	94	1.71			94	1.7
Hungary	61	1.11			61	1.1
Poland	62	1.13			62	1.1
Russia	274	4.99			274	4.9
Finland	22	.40			22	.4
Italy	86	1.57			86	1.5
Other countries	110	2	9	.16	119	2.1
Total foreign	8,440	153.74	13	.24	8,453	153.9
Total	51,055	930.03	3,841	69.97	54,896	1,000.0

TABLE X.—*Causes of rejection on primary examination among 71.250 recruit physically examined during the year 1898, with corresponding ratios per thou sand of each race examined.*

Number examined	White 66,237		Colored 5,013		Total 71,25	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000
Venereal diseases	535	8.08	157	31.31	692	9.7
Other infectious diseases	113	1.71	29	5.78	142	1.9
Diseases of nutrition, general	45	.68	2	.40	47	.6
Diseases of the nervous system	32	.48	1	.20	33	.4
Diseases of the digestive system	797	12.03	49	9.77	846	11.8
Diseases of the circulatory system	1,763	26.62	116	23.14	1,879	26.3
Diseases of the respiratory organs	123	1.86	15	2.99	138	1.9
Diseases of the genito-urinary system	1,351	20.40	88	17.57	1,439	20.
Diseases of the lymphatic system and ductless glands	44	.66	7	1.40	51	.7
Diseases of the muscles, bones, and joints	145	2.19	23	4.59	168	2.3

TABLE X.—*Causes of rejection on primary examination, etc.*—Continued.

Number examined	White....	66.237	Colored....	5,013	Total......	71,250
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Diseases of the integument and subcutaneous connective tissue	240	3.62	15	2.99	255	3.58
Diseases of the eye	2,388	36.05	92	18.35	2,480	34.81
Diseases of the ear	194	2.93	5	1	199	2.79
Diseases of the nose	34	.51	2	.40	36	.51
Hernia	442	6.67	36	7.18	478	6.71
Other injuries	186	2.81	8	1.60	194	2.72
Overheight	7	.11	----------	----------	7	.10
Underheight	297	4.48	29	5.78	326	4.58
Overweight and obesity	82	1.20	8	1.60	90	1.26
Underweight	1,227	18.52	74	14.76	1,301	18.26
Imperfect physique	2,364	35.69	212	42.29	2,576	36.15
Mental insufficiency	40	.60	7	1.40	47	.66
Over age	41	.62	3	.60	44	.62
Minors	147	2.22	15	2.99	162	2.27
Married, or having dependent relatives	126	1.90	14	2.79	140	1.96
Illiteracy	52	.79	1	.20	53	.74
Imperfect knowledge of English	25	.38	----------	----------	25	.35
Reenlistment disapproved for various reasons	18	.27	5	1	23	.32
Character bad or doubtful	259	3.91	10	1.99	269	3.78
Reference, none or unsatisfactory	36	.54	----------	----------	36	.51
Aliens	16	.24	----------	----------	16	.22
General unfitness and undesirable	265	4	47	9.37	312	4.38
No vacancies	19	.29	3	.60	22	.31
Unclassified	223	3.37	15	2.99	238	3.34
Total	13,676	206.47	1,088	217.04	14,764	207.21

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1898.*

No.		White.	Colored.	Total
1	Total number of recruits examined	66,237	5,013	71,25
	Of each 1,000 of these—			
2	Were accepted for service	770.79	766.23	770.4
3	Were rejected for under height	4.48	5.78	4.5
4	Were rejected for disabilities	201.99	211.26	202.6
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.33	.52	.3
6	61 to 62	.27	.52	.2
7	62 to 63	1.08	1.56	1.1
8	63 to 64	9.15	11.20	9.2
9	64 to 65	104.06	115.34	104.8
10	65 to 66	140.85	137.46	140.7
11	66 to 67	172.11	176,52	172.4
12	67 to 68	179.93	180.68	179.9
13	68 to 69	159.02	147.88	158.2
14	69 to 70	110.80	114.03	111.0
15	70 to 71	67.38	64.57	67.1
16	71 to 72	33.28	29.16	32.9
17	72 to 73	14.67	13.02	14.5
18	73 to 74	4.74	5.99	4.8
19	74 upward	2.33	1.56	2.2
	Causes of rejection (exclusive of under height) expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	.68	.40	.6
21	Tuberculosis of lungs or other organs	1.86	2.99	1.9
22	Imperfect vision	35.54	18.35	34.3
23	Heart disease	18.03	17.75	18.0
24	Goitre	.26	.20	.2
25	Varicose veins, varicocele, hemorrhoids	25.23	15.76	24.4
26	Hernia	6.67	7.18	6.7
27	Flat feet	1.83	3.02	1.9

INTERNATIONAL TABLE III.—*Movements of sick, by branches of military service and by months.*

	Absolute numbers.					Proportions per 1,000.			
	Mean strength.	Sick admissions.	Sick disposed of.			In 1,000 of mean strength there were—		In 1,000 sick disposed of there were—	
			Total.	As fit for duty (recovered).	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry	20,178	50,706	48,558	40,277	697	2,513.06	39.31	829.45	14.3
Cavalry	9,585	20,450	19,876	17,103	197	2,133.54	25.04	860.48	9.9
Artillery	9,565	21,708	21,045	19,860	109	2,269.52	13.80	943.69	5.1
Ordnance	672	713	685	668	8	1,061.01	16.37	975.18	11.6
Engineers	595	1,007	992	906	10	1,692.44	25.21	913.31	10.0
Medical Department	3,738	4,657	4,339	3,176	83	1,245.85	22.74	731.97	19.1
All others	2,302	882	858	703	6	383.14	3.91	819.35	6.9
MONTH.									
January	27,576	2,395	2,379	2,327	7	86.85	.47	978.15	2.9
February	27,548	2,161	2,197	2,143	4	78.48	.29	975.42	1.8
March	28,183	2,433	2,321	2,260	5	86.33	.32	973.72	2.1
April	29,485	2,411	2,605	2,538	4	81.76	.34	974.28	1.5
May	38,816	3,696	3,747	3,638	8	95.22	.31	970.91	2.1
June	47,867	3,819	3,363	3,194	16	79.79	.71	949.75	4.7
July	54,048	10,247	7,507	6,378	163	189.60	4.44	849.61	21.7
August	56,362	15,207	13,048	9,230	360	269.81	6.69	707.39	27.5
September	59,650	17,012	16,437	11,418	283	285.21	4.96	694.66	17.2
October	60,636	12,944	13,984	12,333	131	213.47	2.34	881.93	9.3
November	63,768	12,835	13,309	12,516	71	201.28	1.18	940.42	5.3
December	65,681	14,963	15,456	14,718	58	227.81	1.05	952.23	3.7

INTERNATIONAL TABLE VI.—*Admissions of important diseases, by branches of military service.*

No.	Diseases of the international nosological table.	Absolute number of admissions.							Admissions per 1,000 of mean strength.						
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	370	64	212	13	17	27	4	18.34	6.68	22.17	19.35	28.57	7.22	1.74
2	Bronchitis acuta	1,959	937	1,420	57	43	117	56	97.09	97.76	148.46	84.82	72.27	31.30	24.33
3	Cholera asiatica	------	------	------	------	------	------	------	------	------	------	------	------	------	------
4	Cholera nostras	14	19	13	4	1	------	4	.69	1.98	1.36	5.95	1.68	------	1.74
5	Diphtheria et croup	7	------	6	------	------	4	------	.35	------	.63	------	------	1.07	------
6	Dysenteria	646	279	237	8	7	120	13	32.02	29.11	24.78	11.90	11.76	32.10	5.65
7	Erysipelas	10	8	3	------	3	2	1	.50	.83	.31	------	5.04	.54	.43
8	Febris intermittens (malaria)	13,154	4,247	3,336	59	208	672	151	651.96	443.09	348.78	87.80	349.58	179.78	65.59
9	Febris recurrens	5,203	1,149	1,051	5	56	670	49	257.86	119.88	109.87	7.44	94.12	179.23	21.29
10	Gonorrhea	905	432	693	7	13	88	27	44.85	45.07	72.46	10.42	21.85	23.54	11.73
11	Hernia	134	44	45	7	2	22	1	6.64	4.59	.47	10.42	3.36	5.89	.43
12	Influenza	640	226	453	66	4	101	20	31.72	23.58	47.36	98.22	6.72	27.02	8.69
13	Insolatio (hitzschlag, coup de chaleur)	208	17	18	------	1	4	1	10.31	1.77	1.88	------	1.68	1.07	.43
14	Meningitis cerebrospinalis epidemica	21	3	4	------	2	2	------	1.04	.31	.42	------	3.36	.54	------
15	Morbilli	742	194	150	1	9	67	7	36.78	20.24	15.68	1.49	15.13	17.92	3.04
16	Parotitis epidemica	128	43	17	------	------	21	3	6.34	4.49	1.78	------	------	5.62	1.30
17	Pneumonia crouposa sive lobaris	92	66	20	2	------	15	1	4.56	6.89	2.09	2.96	------	4.01	.43
18	Rheumatismus articulorum	186	67	38	3	9	18	7	9.22	6.99	3.97	4.46	15.13	4.82	3.04
19	Scarlatina	3	3	------	------	------	6	------	.15	.31	------	------	------	1.61	------
20	Scorbutus	2	------	------	------	------	------	------	.10	------	------	------	------	------	------
21	Syphilis	231	97	112	------	5	19	6	11.45	10.12	11.71	------	8.40	5.08	2.61
22	Trachoma	------	------	------	------	------	------	------	------	------	------	------	------	------	------
23	Tuberculosis pulmonum	59	27	22	------	3	17	1	2.92	2.82	2.30	------	5.04	4.55	.43
24	Tuberculosis ceterorum organorum	12	4	------	------	------	1	------	.59	.42	------	------	------	.27	------
25	Typhus abdominalis	1,868	891	596	5	13	723	34	92.58	92.96	62.31	7.44	21.85	193.41	14.77
26	Typhus exanthematicus	1	------	------	------	------	------	------	.05	------	------	------	------	------	------
27	Variola	8	2	1	------	------	3	------	.40	.21	.10	------	------	.80	------
28	Morbi auris	144	62	79	7	4	19	5	7.14	6.47	8.26	10.42	6.72	5.08	2.17
29	Morbi cordis	116	44	59	------	2	15	3	5.75	4.59	6.17	------	3.36	4.01	1.30
30	Morbi cutis	866	930	890	21	40	51	27	42.92	97.03	93.05	31.25	67.23	13.64	11.73
31	Morbi mentis	1,154	390	671	39	36	142	31	57.19	40.69	70.15	58.04	60.51	37.99	13.47
32	Morbi oculi	188	111	123	7	2	20	5	9.32	11.58	12.86	10.42	3.36	5.35	2.17
33	Morbi systemat. urin. et sexual. (excl. ven. et. syph.)	267	119	120	5	2	29	7	13.23	12.41	12.54	7.44	3.36	7.76	3.04

INTERNATIONAL TABLE VII.—*Admissions of important diseases, by months (absolute numbers).*

No.	Diseases of the international nosological table.	Admissions, by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	70	55	60	44	24	23	21	34	86	88	89	113
2	Bronchitis acuta	213	171	208	157	143	103	113	236	366	584	920	1,375
3	Cholera asiatica												
4	Cholera nostras			1	1	1	3	18	12	12	6		1
5	Diphtheria et croup		2						1	5	2	2	5
6	Dysenteria	1	1	6	6	36	56	162	394	294	176	93	85
7	Erysipelas	3	2	7	1	2		1	3		2	1	5
8	Febris intermittens (malaria)	50	41	44	71	173	266	2,194	3,824	4,582	3,409	3,466	3,707
9	Febris recurrens	2	4	7	10	19	38	569	1,581	2,227	1,487	1,126	1,113
10	Gonorrhea	105	92	116	102	101	107	118	193	205	292	391	343
11	Hernia	6	8	1	4	6	18	23	44	48	32	39	26
12	Influenza	120	132	138	129	37	30	14	33	83	49	97	648
13	Insolatio (hitzschlag, coup de chaleur)				1	7	12	163	48	10	8		
14	Meningitis cerebrospinalis epidemica	1		1		3	3	5	3	1	1		14
15	Morbilli	23	18	45	26	42	267	256	171	74	28	40	180
16	Parotitis epidemica	16	13	10	18	15	12	9	18	29	13	24	35
17	Pneumonia crouposa sive lobaris	6	5	10	7	11	13	12	15	27	28	24	38
18	Rheumatismus articulorum	20	13	16	17	10	12	27	34	33	41	48	57
19	Scarlatina				1			1	3	2	1	2	2
20	Scorbutus							2					
21	Syphilis	35	29	31	12	15	27	26	43	60	46	69	77
22	Trachoma												
23	Tuberculosis pulmonum	3	4	8	1	2	7	5	19	27	21	16	16
24	Tuberculosis ceterorum organorum	2				2			2	4	1	4	2
25	Typhus abdominalis	9	3	4	6	19	106	501	1,420	1,168	540	233	121
26	Typhus exanthematicus									1			
27	Variola								1	2	5	2	4
28	Morbi auris	9	18	11	6	21	15	24	36	51	40	43	46
29	Morbi cordis	8	4	10	7	2	4	18	31	31	50	35	39
30	Morbi cutis	131	127	139	118	202	181	265	343	323	293	380	323
31	Morbi mentis	132	106	127	97	98	116	146	297	416	312	308	308
32	Morbi oculi	16	26	30	28	35	30	30	48	38	45	67	63
33	Morbi systemat. urin. et sexual. (excl. ven. et syph.)	36	25	25	17	20	15	28	64	103	66	78	72

Respectfully submitted.

GEO. M. STERNBERG, *Surgeon-General.*

Hon. ELIHU ROOT, *Secretary of War.*

O

REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDED JUNE 30, 1900.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1900.

C.

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REPORT

OF

THE SURGEON-GENERAL.

War Department,
Surgeon-General's Office,
Washington, D. C., October 17, 1900.

Sir: In submitting a report of my administration of the duties of this office during the past year, I have the honor, first, to invite attention to a statement of the financial transactions for the year ended June 30, 1900.

FINANCIAL STATEMENT, 1900.[1]

Medical and hospital department, 1900.

Appropriated by act approved March 3, 1899	$1,500,000.00	
Transferred from appropriation "Medical and hospital department, 1899," by act approved February 9, 1900	500,000.00	
		$2,000,000.00
Gain on exchange of funds to insular possessions	12.50	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $12)	424.54	
		437.04
Total to be accounted for		2,000,437.04
Disbursed during the year:[2]		
Expenses of medical supply depots	547.03	
Medical supplies	1,164,419.72	
Medical attendance and medicines	13,680.92	
Medical expenses of recruiting	49,751.04	
Pay of nurses	124,146.24	
Pay of other employees	137,286.72	
Washing of hospital linen	58,005.54	
Expressage on medical property	948.18	
Exchange on funds to insular possessions	437.50	
Notarial fees	30.75	
		1,549,253.64

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[1] The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

[2] Disbursements during June and balance June 30, 1900, at Cebu, P. I., have not at this date (October 10, 1900) been accounted for to this office, doubtless because of irregularity of mail communication.

Transferred by Treasury settlements to adjust appropriations		$5,719.51
Balances on hand June 30, 1900:		
In United States Treasury	$337,239.56	
In hands of disbursing officers—		
New York	34,922.17	
Washington	15,083.34	
St. Louis	14,427.01	
San Francisco	11,824.37	
St. Michael, Alaska	4,790.05	
Honolulu, H. I	1,528.18	
Manila, P. I	17,491.47	
Iloilo, P. I	603.93	
Cebu, P. I. (May 31, 1900)[1]	93.67	
Aparri, P. I	31.54	
Havana, Cuba	1,696.83	
Santiago, Cuba	406.41	
San Juan, P. R	2,668.08	
Ponce, P. R	2,655.95	
Hospital ship *Relief*	1.33	
		445,463.89
Total accounted for		2,000,437.04

Medical and hospital department, 1899.

Balances on hand July 1, 1899, acts of March 15, 1898, January 5, 1899, and March 3, 1899		[2] $1,454,151.99
Gain on exchange of funds to insular possessions	$19.36	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $6,323.99)	7,071.44	
		7,090.80
Total to be accounted for		1,461,242.79
Disbursed during the year:		
Expenses of medical supply depots	69.18	
Medical supplies	478,817.75	
Medical attendance and medicines	41,640.94	
Medical expenses of recruiting	7,125.98	
Medical expenses of muster out	99.60	
Pay of nurses	14,150.24	
Pay of other employees	3,118.33	
Washing of hospital linen	4,527.94	
Expressage on medical property	1,661.28	
Exchange on funds to insular possessions	114.57	
		551,325.81
Transferred by Treasury settlements to adjust appropriations		24,835.28
Transferred to appropriation "Medical and hospital department, 1900," by act approved February 9, 1900		500,000.00
Balances on hand June 30, 1900:		
In United States Treasury	$349,837.31	
In hands of disbursing officers:		
Washington, D. C	27,946.97	
Manila, P. I	7,297.42	
		385,081.70
Total accounted for		1,461,242.79

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[1] See note 2 on page 7.

[2] The balance June 30, 1899, as given in my last annual report ($1,448,387.37), was based in part upon information by cable from Manila, which was subsequently, upon the receipt of itemized accounts by mail, found to be erroneous.

Medical and hospital department, 1898.

Balances on hand July 1, 1899, act of March 2, 1897		$366.18
Refunded during the year		14.37
Total to be accounted for		380.55
Disbursed during the year:		
Medical supplies	$26.72	
Medical attendance and medicines	339.05	365.77
Transferred to surplus fund		14.78
Total accounted for		380.55

Medical and hospital department, January 1, 1899.

Balances on hand July 1, 1899, acts of May 4, June 8, and July 7, 1898 (net)		[1]$4,918.66
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $24,834)		24,895.63
Total to be accounted for		29,814.29
Disbursed during the year:		
Medical supplies	$654.02	
Medical attendance and medicines	48.00	
Medical expenses of recruiting	90.00	
Pay of nurses	1,604.87	
Pay of other employees	321.68	
Washing of hospital linen	564.17	
Miscellaneous	10.31	3,293.05
Balances on hand June 30, 1900:		
In United States Treasury	25,991.71	
In hands of disbursing officer at Manila, P. I.	529.53	26,521.24
Total accounted for		29,814.29

Medical and hospital department, certified claims.

Appropriated by act approved June 6, 1900	$318.93
Disbursed during the year	318.93

Appropriation for national defense, act of March 9, 1898.

Allotment by the President April 16, 1898:	
Balance on hand July 1, 1899	$5.51
Balance in United States Treasury June 30, 1900	5.51
Reallotment by the President September 8, 1898:	
Balance on hand July 1, 1899	1,679.78
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $34)	51.00
Total to be accounted for	1,730.78

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[1] Actual balances, as shown by the books of this office, $12,715.27, of which $7,796.61 was pledged to honor drafts made by the medical disbursing officer in the Philippine Islands on the Hongkong and Shanghai Banking Corporation under a letter of credit issued in his favor. These drafts were paid by the bank and the proceeds thereof were accounted for during the year ended June 30, 1899. The bank was reimbursed by the Treasury Department in August, 1899.

Reallotment by the President September 8, 1898—Continued.		
Disbursed during the year: Medical attendance and medicines		$138.19
Balance in United States Treasury June 30, 1900		1,592.59
Total accounted for		1,730.78
Allotment by the President October 6, 1898:		
Balance on hand July 1, 1899		44,521.89
Refunded during the year		194.58
Total to be accounted for		44,716.47
Disbursed during the year:		
Expenses of medical supply depots	$1.50	
Medical supplies	834.82	
Medical attendance and medicines	17,938.99	
Medical expenses of recruiting	438.70	
Pay of nurses	333.75	
Washing of hospital linen	302.07	
		19,849.83
Transferred by Treasury settlement to adjust appropriation		742.01
Balance in United States Treasury June 30, 1900		24,124.63
Total accounted for		44,716.47
Allotment by the President November 22, 1898:		
Balance on hand July 1, 1899		26,236.30
Refunded during the year		12.00
Total to be accounted for		26,248.30
Disbursed during the year:		
Medical supplies	1,100.95	
Medical attendance and medicines	53.66	
Medical expenses of recruiting	3,300.31	
Pay of nurses	54.00	
Washing of hospital linen	257.70	
		4,766.62
Balance on hand June 30, 1900:		
In United States Treasury	13,153.26	
In hands disbursing officer, Washington, D. C.	8,328.42	
		21,481.68
Total accounted for		26,248.30

Artificial limbs, 1900.

Appropriated by act approved March 3, 1899	$547,275.00
Disbursed during the year	503,972.95
Balance on hand June 30, 1900	43,302.05

Artificial limbs, 1899 (act approved July 1, 1898).

Balance July 1, 1899		$2,621.09
Disbursed during the year	$2,396.09	
Transferred by Treasury settlements to adjust appropriations	225.00	
		2,621.09

Artificial limbs, 1898 (act approved June 4, 1897).

Balance July 1, 1899	$16,516.21
Refunded during the year (being the amount transferred by Treasury Department to adjust appropriations)	150.00
Total to be accounted for	16,666.21
Disbursed during the year	1.20
Transferred to surplus fund	16,665.01
Total accounted for	16,666.21

Artificial limbs, 1897 (act approved June 11, 1896).

Balance July 1, 1899	$540.16
Refunded during the year (being the amount transferred by the Treasury Department to adjust appropriations)	75.00
Total to be accounted for	615.16
Transferred to surplus fund	615.16

Appliances for disabled soldiers, 1900.

Appropriated by act approved March 3, 1899	$2,000.00
Disbursed during the year	1,020.50
Balance on hand June 30, 1900	979.50

Appliances for disabled soldiers, 1899 (act approved July 1, 1898).

Balance July 1, 1899	$722.11
Disbursed during the year	32.00
Balance on hand June 30, 1900	690.11

Appliances for disabled soldiers, 1898 (act approved June 4, 1897).

Balance July 1, 1899	$590.54
Transferred to surplus fund	590.54

Appliances for disabled soldiers, 1897 (act approved June 11, 1896).

Balance July 1, 1899	$285.02
Transferred to surplus fund	285.02

Army Medical Museum, 1900.

Appropriated by act approved March 3, 1899	$5,000.00
Disbursed during the year	2,886.57
Balance on hand June 30, 1900	2,113.43

Army Medical Museum, 1899 (act approved March 15, 1898).

Balance July 1, 1899	$1,636.31
Disbursed during the year	1,621.51
Balance on hand June 30, 1900	14.80

Army Medical Museum, certified claims.

Appropriated by act approved June 6, 1900	$0.75
Disbursed during the year	.75

Library, Surgeon-General's Office, 1900.

Appropriated by act approved March 3, 1899	$10,000.00
Disbursed during the year	8,775.37
Balance on hand June 30, 1900	1,224.63

Library, Surgeon-General's Office, 1899 (act approved March 15, 1898).

Balance July 1, 1899	$273.36
Disbursed during the year	273.36

Furnishing trusses to disabled soldiers (sections 1176, 1177, 1178, Revised Statutes, and act of March 3, 1879).

Expended during the year	$7,798.47

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the laws relating to artificial limbs there were furnished in kind during the year ended June 30, 1900, 292 artificial legs, 9 artificial arms, 2 artificial feet, and 1 apparatus for exsection. Commutation certificates were issued for 2,570 cases of amputated leg. 2.759 of amputated arm, 66 of amputated foot, and for 2.881 cases of the loss of the use of a limb. The sum of $506,595.24 was expended during the year in settling these claims.

The benefits under these laws recur every three years. The claimants who are being paid during the current year ending June 30, 1901, are the survivors of the beneficiaries of the year ended June 30, 1898. The sum of $173,000 was estimated for and appropriated for their benefit. The claims which will be presented for settlement during the year ending June 30, 1902, will be made by the survivors of those who were last paid during the year ended June 30, 1899, when $125,038.91 was disbursed in settlement. Estimates for $125.000 have been submitted for 1902. It was considered injudicious to reduce the estimates below the sum required three years ago, as deaths among disabled veterans of the civil war may to a considerable extent be offset by cases arising as a result of disabilities incurred during the past two years in Cuba, Porto Rico, and the Philippines.

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,052.50 was expended for 140 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 1,054.

PROVIDENCE HOSPITAL.

The act of Congress approved June 6, 1900, appropriated $19.000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with the Providence Hospital by the Surgeon-General of the Army. The amount of relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1899	143
Admitted during the year	1,349
Total number treated	1,492
Average number admitted per month	124
Number remaining in hospital June 30, 1900	135
Total number of days' treatment afforded	43,560
Average number of days' treatment per patient	40
Average number of patients treated per day	111
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	24

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

Officers' division.—Twenty-seven officers were under treatment during the calendar year 1899. Twenty-three were returned to duty, or to their homes, much improved, if on the retired list, after treatment extending over an average period of 64 days; 1 died, and 3 remained in hospital December 31, 1899.

Enlisted men's division.—One hundred and eighty cases were admitted during the year, which, with 48 remaining from 1898, make a total of 228 cases treated. One hundred and ten of these were returned to duty, 59 were discharged for disability, 15 by expiration of term of service or special orders, 2 died, and 42 remained under treatment December 31, 1899. Of those discharged on certificates of disability, 26 were cases of rheumatism and 11 of gunshot wounds.

Division of ex-volunteers.—Under regulations prescribed by the Surgeon-General of the Army, and approved by the Secretary of War, ex-volunteers of the war of the rebellion have been admitted to this hospital since May 10, 1897, and ex-volunteers of the Spanish-American war since November 9, 1898. During the year ending December 31, 1899, 175 permits were issued to ex-volunteers of both wars. One hundred and thirty cases availed themselves of this permission and were admitted for treatment. The remaining 45 permits were canceled, as the beneficiaries, for various reasons, could not take advantage of them. Most of those who were treated returned to their homes much benefited; 2 veterans of the civil war died in the hospital during the year; 16 cases remained under treatment December 31, 1899.

THE ARMY MEDICAL MUSEUM AND LIBRARY BUILDING.

This building was originally erected by an appropriation which comprised only 50 per cent of that called for by the estimates. It was, therefore, materially curtailed, not only in its proportions but in its conveniences for the ends in view. The growth of the collections has now reached a point where there is some embarrassment in properly caring for them. This is felt particularly in the library. One large room originally designed for library purposes has been diverted to the uses of the Record and Pension Office of the War Department, and is entirely removed from the control of this office. It is much needed for the display and care of the originals and duplicates of the library property, the latter of which are now so crowded in basement rooms as to be practically inaccessible. I therefore renew the request that the whole of the Museum and Library Building be devoted to its legitimate purpose.

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1900, was 35,420. The following statement shows in detail the additions and changes in the different sections:

Pathological section:	
In Museum June 30, 1899	11,631
Discarded	17
	11,614
Received during the year	263
In Museum June 30, 1900	11,877
Anatomical section:	
In Museum June 30, 1899	1,529
Discarded	1
	1,528
Received during the year	12
In Museum June 30, 1900	1,540

Section of comparative anatomy:		
In Museum June 30, 1899		1,432
In Museum June 30, 1900		1,432
Microscopical section:		
In Museum June 30, 1899		12,750
Added during the year		141
In Museum June 30, 1900		12,891
Miscellaneous section:		
In museum June 30, 1899		2,427
Discarded		1
		2,426
Received during the year		68
In museum June 30, 1900		2,494
Provisional pathological section:		
In museum June 30, 1899		2,063
Discarded	1	
Returned to contributor	1	
Transferred to other institutions	3	
		5
In museum June 30, 1900		2,058
Provisional anatomical section:		
In museum June 30, 1899		895
Transferred to other institutions		139
In museum June 30, 1900		756
Photographic series:		
In museum June 30, 1899		2,312
Received during the year		60
In museum June 30, 1900		2,372

RECAPITULATION.

Specimens in the museum June 30, 1899	35,039
Discarded, transferred, etc	163
	34,876
Added during the year	544
Specimens in museum June 30, 1900	35,420

The following are some of the more interesting specimens added to the museum collection during the past fiscal year:

11727. Typhoid ulceration of ileum with perforation and peritonitis; from a soldier. Contributed by Acting Asst. Surg. J. J. Curry, U. S. A.

11855–11873. Series of 17 specimens of typhoid fever, and 2 of amœbic dysentery; from soldiers at Fort McPherson, Ga., during Spanish-American War. From post-mortem examinations made by Acting Asst. Surg. R. Norton, U. S. A. One of the fever specimens shows healing, 5 show perforations, 1 was complicated with ulceration of larynx, 1 with parotitis, and 1 with malaria.

11852. Head of an infant showing pseudencephalus. Contributed by Dr. V. B. Jackson, Washington, D. C.

11844–11846. Solitary tubercle of brain of child 9 years old, which had had epileptic fits and died in convulsions. The suprarenal capsules were also tubercular. Contributed by Dr. G. N. Acker, Washington, D. C.

11935–11936. Sarcoma of cerebellum and lung, and tuberculosis of lung, from a woman aged 50, who had also a cancerous breast removed. These conditions were all verified by microscopical examination. Contributed by Dr. D. S. Lamb, Washington, D. C.

11945. Skullcap of boy 5 years old, showing healing after trephining for traumatic epilepsey, which was thereby relieved. The boy was afterwards accidentally killed. Contributed by Acting Asst. Surg. James S. Kennedy, U. S. A.

11726. Aneurism of abdominal aorta which ulcerated and perforated into duodenum; from a soldier who died suddenly. The case was complicated with a malarial spleen, chronic interstitial nephritis, tubercular mesenteric glands, and general arterio-sclerosis. Contributed by Acting Asst. Surg. J. J. Curry, U. S. A.

11812–11813. Aneurism of popliteal artery; femoral artery tied; failure of collateral circulation; gangrene of foot and lower leg, requiring amputation. The colors in the grangenous limb have been beautifully preserved by the Kaiserling method. From an old soldier. Contributed by Maj. L. A. La Garde, surgeon, U. S. A.

11982. Aneurism of arch of aorta which ruptured and caused sudden death. A large pouch opening by a small aperture into the arch. From a soldier. Contributed by Capt. E. A. Mearns, assistant surgeon, U. S. A.

11920–11921. Acute tuberculosis of pericardium and spleen, from a man aged 32. Contributed by Dr. D. S. Lamb, Washington, D. C.

11877–11878. Acute vegetative endocarditis, with chronic pericarditis, and large embolic infarctions of spleen and kidneys; from a woman aged 26. There was a history of rheumatism. Contributed by Dr. D. S. Lamb.

11849–11850. Vegetative endocarditis of both sides, with large embolic infarction of the spleen. From a woman aged 26, who had suffered from rheumatism. Contributed by Dr. H. M. Newman, Washington, D. C.

11853. Cancer of larynx. Contributed by Dr. T. C. Smith, Washington, D. C.

11919. Cancer of œsophagus. Contributed by Dr. W. W. Johnston, Washington, D. C.

11834. Mesenteric hernia, which became strangulated and caused death in a man aged 24. Contributed by Dr. D. S. Lamb, Washington, D. C.

11883–11886. Large retroperitoneal tumor, conjoined with strangulated internal abdominal hernia, which caused death in a man aged 45. Contributed by Dr. D. S. Lamb, Washington, D. C.

11814. Amœbic abscess of the liver. Contributed by Dr. G. N. Acker, Washington, D. C.

11924. Gas bacillus dilatation of hepatic vessels; from a woman. Contributed by Acting Asst. Surg. James Carroll, U. S. A.

11937. Atrophy of kidneys with dilatation; right ureter nearly impervious; bladder contracted and ulcerated; prostatic portion of urethra ulcerated; from a soldier who had had cystitis and died of peritonitis. Contributed by Dr. Robert Pillow.

11933. Kidney showing atrophy and dilatation apparently caused by ureteral calculus. Removed by operation from a woman aged 38. Recovery. Contributed by Dr. J. W. Bovee, Washington, D. C.

11984. Kidneys showing hemorrhages into cortex; from a soldier who had gonorrhea. Contributed by Maj. W. C. Borden, surgeon, U. S. A.

11935. Chronic hemorrhagic inflammation of kidney; from a man aged 70. Contributed by Dr. D. S. Lamb, Washington, D. C.

11983. Calculi removed by operation from the kidney of a soldier. Contributed by First Lieut. J. H. Ford, assistant surgeon, U. S. A.

11728. Calculus weighing 190 grains removed from the bladder of a boy aged 5 years. Superpubic cystotomy. Recovery. Contributed by Dr. J. Ford Thompson, Washington, D. C.

11882. Fungoid growth of penis from chronic inflammation; amputation. Recovery. From a soldier aged 26 who had had chancroid and phymosis. Contributed by Acting Asst. Surg. W. T. Baird, U. S. A.

11836. Testicle, weighing 32 ounces and measuring 7.5 by 4 by 3.5 inches, of a horse 10 years old; removed for cancer. Recovery. Contributed by D. E. Buckingham, veterinary surgeon, Washington, D. C.

11941. Large cyst of Fallopian tube. Removed by the contributor, Dr. J. W. Bovee, Washington, D. C.

11874. Ankylostomum duodenale. From one of a series of cases observed in Porto Rico by the contributor, First Lieut. B. K. Ashford, assistant surgeon, U. S. A.

11725. The bones of a case of mycetoma of leg and foot; showing cavities filled with actinomyces. Contributed by Acting Asst. Surg. J. T. Arwine, U. S. A.

11745–11774 and 11903–11913. Series of 41 models showing the rarer forms of disease of the skin. Made and colored by Dr. J. Baretta, of the St. Louis Hospital, Paris. Purchased.

11946. Odontoma, weighing 3 pounds, from a 9-year-old horse whose jaw had been broken in early life. The tumor developed as a consequence. Purchased.

11947–11952. Artificial dentures carved of hippopotamus tusk and ivory in Paris previous to 1854. Contributed by Dr. James Gordon, St. Thomas, Danish West Indies.

11956–11960. Old-fashioned artificial dentures of ivory. Contributed by Dr. A. E. N. Lister, Lincoln, England.

11969–11970. Peculiar bridge work made by a Mohammedan goldsmith in the East Indies. The teeth are stained from chewing betel nut. Contributed by Dr. J. W. Egbert, Madras, India.

11980–11981. Plaster casts of dentures of Crow and Cheyenne Indians, showing entire absence of disease, which the contributor attributes to a purely meat diet. Contributed by Dr. W. A. Allen, Billings, Mont.

11739. Ivory denture made at Toronto, Canada, about one hundred years ago. Contributed by Dr. W. A. Campbell, Brooklyn, N. Y.

11794. Ivory dentures made in 1849 by Dr. Theo. Chupein, now of Philadelphia, Pa.

11818–11821. Plaster casts of dentures to illustrate the mechanism of retracting and retaining the side teeth. Contributed by E. S. Fuller, Piqua, Ohio.

11824–11829. Japanese artificial dentures made of wood; some with white stones to represent teeth; the stones are blackened when a woman is married. The molar region shows rows of nail heads. Contributed by Dr. A. G. Smith, Yokohama, Japan.

11876, 11890, 11894, and 11895. Plaster casts of dentures to show shape of hard palate in mouth breathing. Contributed by Dr. M. C. Smith, Lynn, Mass.

11897. Plaster casts of dentures showing destruction of palate and alveolar arches by lupus. Contributed by Dr. M. C. Smith, Lynn, Mass.

11808. Bird shot embedded for twenty years in the neck of a tooth. Contributed by Dr. E. E. Slaton, Eclectic, Ala.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year 1899–1900:

Description.	On hand June 30, 1899.	Added during fiscal year.	Total June 30, 1900.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	39,094	1,324	40,418
Medical transactions	6,153	139	6,292
Bound theses	1,989	65	2,054
Bound pamphlets	2,670	84	2,754
Other medical books	81,966	2,411	84,377
Total	131,872	4,023	135,895
Medical theses	[1]61,120	1,846	62,966
Medical pamphlets	61,775	5,250	67,025
Total	122,895	7,096	129,991

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[1] Of the total number of theses on hand June 30, 1899, there were 828 bound in 65 volumes, and 646 pamphlets bound in 53 volumes during the year.

There were presented to the library during the year 557 books and 8,740 pamphlets and journals.

Volume V, second series, of the Index Catalogue, includes the letters "E" and "F" from "Enamel" to "Fyuner," and forms a volume of 1,127 pages. It will be ready for distribution at the usual time. The appropriation for Volume VI, second series, having been made, the manuscript is in course of preparation for the printer.

MEDICAL OFFICERS.

UNITED STATES ARMY.

An army medical board convened by Special Orders, No. 15, Adjutant-General's Office, January 18, 1900, at Manila, P. I., approved 16 candidates, 1 of whom died before the report of the board was received.

Another board convened by Special Orders, No. 81, Adjutant-General's Office, April 6, 1900, at Havana, Cuba, examined 15 candidates during its session from May 1 to 28, 1900; 4 of these were approved, 10 were rejected as disqualified professionally, and 1 withdrew after partial examination.

Appointments.—None during the year.

Promotions.—One deputy surgeon-general with the rank of lieutenant-colonel to be assistant surgeon-general with the rank of colonel; 3 surgeons with the rank of major to be deputy surgeons-general with the rank of lieutenant-colonel; 5 assistant surgeons with the rank of captain to be surgeons with the rank of major.

Vacancies.—Twelve.

Deaths.—One surgeon with the rank of major; 1 assistant surgeon with the rank of captain (chief surgeon United States Volunteers with the rank of major); 1 assistant surgeon with the rank of first lieutenant.

Retirements.—One assistant surgeon-general with the rank of colonel; 2 deputy surgeons-general with the rank of lieutenant-colonel; 1 surgeon with the rank of major; 1 assistant surgeon with the rank of captain, retired with the rank of major.

Wholly retired.—One assistant surgeon with the rank of captain.

Resigned.—One assistant surgeon with the rank of captain.

Dropped from the Medical Department United States Army, having failed to accept commission.—One assistant surgeon with the rank of first lieutenant.

The Medical Department consists at present of 192 officers, a number which barely sufficed for the needs of the Army before the outbreak of the late war with Spain, and which proved utterly inadequate in number, notwithstanding the earnest efforts of its members to form a satisfactory basis of organization, for the large increase made to our military forces during the progress of that war. Similarly since the close of the war it has been impossible for the Medical Department, without professional assistance from civil life, to provide for the sanitary and medical work at the large number of new posts and stations that have been established at home for coast defense, in Cuba, Porto Rico, and Hawaii for garrison duty, and for the military operations in the Philippine Islands.

Excellent assistance has been obtained by contract with civil physicians, so far as concerns the professional care of the sick and wounded, but much experience is required to fit these medical men for the sanitary work of their position and to familiarize them with army methods. Most of them are young men with no knowledge of military hygiene or medical administration. They accept contracts for a year to see the world or gain professional experience, but not with a view to become expert military sanitarians. They are therefore not qualified to perform successfully many of the duties incumbent upon them. To be an efficient army medical officer, one should be able not only to prescribe for the sick and perform surgical operations, but to point out and remedy all causes tending to produce disease, and to inculcate the spirit of military discipline without which army nurses and attendants are useless. This can not be expected from young civilian physicians whose service in the Army is casual and temporary. On the other hand, the young man who desires to be permanently attached to the medical service of the Army devotes his whole energies to perfect himself for the work of his life. A lieutenant and assistant surgeon of the Regular Army has therefore, as a rule, much higher qualifications than the young physician under contract. The desirability of a large increase in our regular medical establishment is obvious. It has been heretofore recommended by me and I trust that favorable action will soon be taken by Congress in this important matter.

In the following letter, dated November 29, 1899, I called attention to the insufficiency of the Medical Department and urged legislation to increase its efficiency by adding to its numbers and providing a probationary period during which candidates for appointment, selected by an examining board in accordance with existing regulations, should be required to undergo a course of instruction to fit them for their duties as army medical officers:

[Subject: Bill for an increase in the Medical Corps of the Army.]

War Department, Surgeon-General's Office,
Washington, November 29, 1899.

Sir: I have the honor to transmit herewith a bill for the increase of the Medical Department of the Army. This increase is very urgently needed, and the number of additional medical officers asked for is very reasonable in view of the greatly increased demands upon the Medical Department during the past two years. The Medical Corps of the Army at present consists of 192 commissioned medical officers, but the requirements of the service are such that at the present time there are over 400 physicians in service as acting assistant surgeons under contracts made with the Surgeon-General of the Army. The number of medical officers was insufficient for our Army of 25,000 men on a peace basis prior to the Spanish-American war. At the present time a large number of posts have been established upon the seaboard of the United States, in Porto Rico, in Alaska, and the Hawaiian Islands, which, presumably, will be permanently garrisoned hereafter. There are at present garrisons at 18 new posts (upon the seaboard) in the Department of the East alone, and in the Department of the Columbia, including Alaskan posts, there are 10. The number of independent garrisons in Porto Rico at present is 11; the number of independent commands in Cuba is 30. At the present time there are stationed in the Philippine Islands, or under orders to report for duty to the commanding general, Department of the Pacific, 52 medical officers of the Regular Army, 23 surgeons of volunteers, 75 regimental surgeons and assistant surgeons of volunteer regiments, and 157 acting assistant surgeons. How many medical officers may be required for duty with troops constituting the permanent garrisons of these islands it is impossible to say at the present time; but there can be no doubt that if the number of medical officers of the Army called for in this bill is authorized by Congress it will still be necessary, for many years to come, to employ a considerable number of contract surgeons to meet the requirements of the service.

It is important in the interests of the service that the Medical Department should have a sufficient number of commissioned officers who have been carefully examined as to their physical and professional qualifications for the service, and who, as the result of special training received in the service, have become familiar with their duties and responsibilities, not only as physicians and surgeons, but as medical officers of the Army. It is also just and proper that those acting assistant surgeons and commissioned medical officers of volunteer regiments who have done good service and have the necessary qualifications, should have the way opened to them to obtain commissions; and it is evident that those who would be the most desirable acquisitions to the service can not afford to remain indefinitely under a contract which may be terminated at any moment, and which affords no prospect of advancement.

In view of the facts stated, I respectfully urge the importance of an increase of the Medical Department of the Army, as provided in the inclosed bill, at the earliest practicable date.

Very respectfully,

Geo. M. Sternberg,
Surgeon-General, United States Army.

The Secretary of War.

BILL for the increase of the Medical Department of the Army.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be added to the number of medical officers of the Army now authorized by law, four assistant surgeons-general with the rank of colonel; ten deputy surgeons-general with the rank of lieutenant-colonel; thirty surgeons with the rank of major; and eighty assistant surgeons with the rank of first lieutenant, who shall have the rank of captain at the expiration of five years' service, as now provided by law: *Provided,* That the original vacancies created by this act in the grade of colonel, lieutenant-colonel, and major shall be filled by seniority promotion in accordance with established laws and regulations.

SEC. 2. Hereafter, candidates for appointment in the Medical Corps of the Army who pass a medical examining board in compliance with existing regulations shall be appointed acting assistant surgeons for a probationary period of six months. During this probationary period they shall attend the Army Medical School established at the Army Medical Museum in the city of Washington, and the faculty of the Army medical school shall report to the Secretary of War at the end of the prescribed course of instruction upon the fitness and relative standing of the probationary candidates; those who are recommended by the faculty may then be commissioned by the President to fill existing vacancies in the Medical Corps of the Army.

SEC. 3. Acting assistant surgeons appointed in accordance with the provisions of section two shall be paid one hundred dollars per month, and shall not be entitled to any allowances or to mileage in reporting for the prescribed course of instruction, or in returning to their homes if they are not recommended for a commission.

SEC. 4. The number of acting assistant surgeons appointed in accordance with the provisions of section two shall not exceed the number of vacancies existing or to result from retirements during the probationary period.

SEC. 5. Candidates who have rendered satisfactory service as acting assistant surgeons, or as commissioned medical officers in the Volunteer Army of the United States for a period of six months or more, shall be exempted from this period of probation and may be commissioned at once if vacancies exist and they pass a satisfactory examination as to their physical, moral, and professional qualifications.

This bill is intended to provide only for an increase in the Medical Corps absolutely necessary for the medical care of the regular troops now in service. If the Army should be increased to 100,000 enlisted strength, a corresponding increase in the Medical Corps would be required, and I have submitted to the honorable the Secretary of War the draft of a bill providing for a suitable medical corps for an army of that size under existing conditions.

UNITED STATES VOLUNTEERS.

During the year 9 appointments have been made as surgeons, United States Volunteers, with the rank of major; 7 of the appointees were from the Regular Army and 2 were acting assistant surgeons, United States Army.

Died.—One chief surgeon with rank of major and 1 surgeon with the rank of major.

At the end of the year there remained in service 34 surgeons with the rank of major, 11 of whom were captains in the regular establishment.

REGIMENTAL SURGEONS AND ASSISTANT SURGEONS, UNITED STATES VOLUNTEERS.

On June 30, 1900, there were 78 regimental surgeons and assistant surgeons in the service—25 majors, 13 of whom were captains in the Regular Army; 27 assistant surgeons with the rank of captain, and 26 assistant surgeons with the rank of first lieutenant.

Deaths.—One lieutenant and assistant surgeon.

These regimental medical officers were appointed in accordance with the provisions of the act of Congress approved March 2, 1899 (an act for increasing the efficiency of the Army and for other purposes). (Chap. 352, Statutes at Large, vol. 30.) Three medical officers were commissioned for each volunteer regiment, one with the rank of major, one with the rank of captain, and one with the rank of first lieutenant. It was the evident intention of Congress that these medical officers should have the pay of the rank respectively held by them, but by a decision of the Comptroller of the Treasury the medical officer commissioned by the President as a captain can receive only the pay of a first lieutenant, and the Paymaster's Department of the Army has necessarily been ruled by this decision. The medical officers who accepted these positions had seen previous service in the war with Spain. Some of them had been brigade surgeons and others regimental surgeons with the rank of major. When they were offered commissions as assistant surgeons with the rank of captain there was no reason to suppose that they would not be paid as captains. I therefore recommend Congressional action to insure to these officers the pay of a "captain, mounted," from the date of their acceptance of such commissions.

ACTING ASSISTANT SURGEONS, UNITED STATES ARMY.

There were in service June 30, 1899, 389 acting assistant surgeons. During the year ended June 30, 1900, contracts were made with 434 physicians, while 358 contracts were annulled and 3 terminated by death, leaving in service June 30, 1900, 462 under contract. Of this number 121 were on duty in the United States, 22 on transports, 10 in Porto Rico, 60 in Cuba, and 249 in the Philippine Islands.

The following tabulation shows the number of contracts with physicians made and annulled from April 17, 1898, to June 30, 1900:

	Out of service.	In service.	Total.
Served under 1 month	34	15	49
Served 1 to 6 months	339	87	426
Served 6 to 12 months	144	73	217
Served 1 to 2 years	78	250	328
Served over 2 years	1	37	38
Total	596	462	1,058

Total number serving in 1898-99	855
Daily average serving in 1898-99	439
Total serving in 1899-1900	618
Daily average serving in 1899-1900	415

Average service of 596 now out of service, five months and twenty-six days.
Average service of 462 now in service, one year and three months.
Average service of 1,058 acting assistant surgeons, nine months and twenty-six days.

All the contract surgeons now in service have been examined by boards of medical officers constituted by me to determine their fitness, physical and professional, for the discharge of their duties. The above tabulation shows, however, that a sufficient inducement is not held out to retain these medical men in service. Out of a total of 1,058 under contract since April 18, 1898, 373 served only six months or less. This is a serious loss to the Department, as it takes about that length of time to familiarize the civilian surgeon with the duties of his new sphere of action. As an inducement for these contract surgeons to remain in service, and as a reward for those who have continued in service for a year or more, I recommend that the commission of assistant surgeon of volunteers be granted them, as provided in a bill which I submitted on April 4, 1900, as follows:

A BILL for the appointment of assistant surgeons of volunteers.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That "contract surgeons" who have rendered faithful and satisfactory service with the Army of the United States for a period of one year, and who have passed a satisfactory examination as to their physical and professional qualifications, shall be commissioned by the President as assistant surgeons of volunteers, with the rank of first lieutenant, subject to honorable discharge from the service whenever their services are no longer required.

SEC. 2. That at the end of two years' service as first lieutenants assistant surgeons of volunteers, appointed in accordance with section one of this act, who have rendered faithful and satisfactory service, shall be commissioned by the President as assistant surgeons of volunteers, with the rank of captain, subject to honorable discharge from the service whenever their services are no longer required; and that they shall receive the pay of a captain mounted.

ARMY MEDICAL SCHOOL.

This school was closed during the school year 1899–1900, as existing conditions in the Medical Department rendered it impracticable to carry out the usual school programme.

BOARDS FOR THE STUDY OF TROPICAL DISEASES.

On my recommendation a board of medical officers, consisting of First Lieut. Jere B. Clayton, assistant surgeon, United States Army; First Lieut. Richard P. Strong, assistant surgeon, United States Army, and Acting Asst. Surg. Joseph J. Curry, was appointed to meet at one of the general hospitals in or near Manila, P. I., to be designated by the commanding general, Department of the Pacific, upon the recommendation of the chief surgeon of the department, for the purpose of studying tropical diseases as they occur in those islands. It was my desire that this board should be given all the appliances and assistance necessary for conducting their researches and every opportunity for obtaining access to cases and making autopsies, etc. In my letter of instruction to the chief surgeon I stated that the members of the board need not necessarily work in the same laboratory, and while pursuing their general investigations they could make blood examinations and bacteriological researches for the purpose of clinical diagnosis as well as with a view to the promotion of our knowledge of infectious diseases prevailing in the Philippines. I stated that if stationed at different hospitals the members of the board should meet occasionally for consultation.

Each member should make an independent report of investigations conducted by him and of the general result of his blood examinations, etc. A quarterly report of progress should be made by each member of the board, which should indicate the nature of the work in which he has been engaged and the results attained. Full and detailed reports relating to particular diseases investigated will be made by the individual members of the board whenever they are prepared to submit such reports.

Special attention should be given to tropical dysentery, to the malarial fevers prevailing in the Philippines, to beri-beri, to intestinal parasites, and in general to all tropical diseases the etiology of which has not been completely worked out.

Some excellent work was done by the members of this board and their associates in the laboratories of the large hospitals. See, for instance, infra page 245, under the heading of "Dysentery."

Another board was appointed to meet at Camp Columbia, Quemados, Cuba, in May, 1900, for the purpose of pursuing scientific investigations with reference to the infectious diseases prevailing in the island of Cuba. This board consisted of Maj. Walter Reed, surgeon, United States Army, and Acting Asst. Surgs. James Carroll, Aristides Agramonte, and Jesse W. Lazear, United States Army.

The instructions to Major Reed, president of this board, included the following:

> You will naturally give special attention to questions relating to the etiology and prevention of yellow fever. As you are familiar with what has already been done by other bacteriologists in this field of investigation, I do not consider it necessary to give you any suggestions or detailed instructions. But it is evident that the most important question which will occupy your attention is that which relates to the etiology of this disease.
>
> You will also take advantage of such opportunities as may offer for the study of other infectious diseases, and especially of the malarial fevers prevailing in the island of Cuba. An important question in connection with the diseases of tropical and semitropical countries relates to the etiology of febrile attacks of short duration, to which strangers are especially subject. Should you have time, there will be ample opportunity for the study of leprosy in the leper's hospital in the city of Havana. Attention should also be given to the infectious diseases of the lower animals, in case any such prevail, the etiology of which has not been definitely determined.
>
> You are authorized to obtain from the medical supply depot in Havana such articles as you may require, upon requisitions approved by the chief surgeon, Division of Cuba. Necessary articles not on hand in that depot should be called for upon special requisitions to be sent to this office.

It is with regret that I have to report the death of one of the members of this board while in the discharge of his duty under the above instructions. Acting Asst. Surg. Jesse W. Lazear died of yellow fever September 25, 1900, at Columbia Barracks, Quemados, Cuba. Acting Asst. Surg. James Carroll, another member of this board, suffered from a severe attack of the disease, but fortunately recovered.

THE HOSPITAL CORPS.

At the close of the fiscal year ending June 30, 1899, the Hospital Corps consisted of 189 hospital stewards, 287 acting hospital stewards, and 2,892 privates, a total of 3,368. During the fiscal year ending June 30, 1900, the gain to the corps was 2,272 men, of whom 1,490 were obtained by the enlistment of civilians, 282 by reenlistment, and 500 by transfer from the line. The corps lost during the same period 1,549 men, the greater part of them by discharge. It is worthy of note that 88 were discharged on certificates of disability, 2 were killed in action, 1 was reported missing, and 27 died of disease. The number of Hospital Corps men in service June 30, 1900, was 167 hospital stewards, 381 acting hospital stewards, and 3,543 privates, a total of 4,091.

Hospital stewards.—The number of hospital stewards decreased during the fiscal year from 189 to 167, it being impossible to fill vacancies as they occurred, inasmuch as the number of hospital stewards considerably exceeded the allowance of 100, which was the number authorized before the war with Spain, the increase in this grade authorized in 1898 having been for the war only. However, by the act of Congress approved May 26, 1900 (published in General Orders, No. 76, Headquarters of the Army, June 1, 1900), 100 additional hospital stewards were allowed. An examination is about to be held to fill the vacancies thus created.

Acting hospital stewards.—Owing to the wording of section 7 of the act of Congress approved March 1, 1887, which established the Hospital Corps, the status of the acting hospital steward has been uncertain. He was, in point of fact, a noncommissioned officer. The wording of the law appeared to provide that the acting steward should be a private temporarily detailed rather than a true noncommissioned officer. The rulings of the accounting officers of the Treasury in regard to this matter in individual cases have varied, but the question having now come up with especial prominence, in view of the fact that several acting hospital stewards have been placed upon the retired list, a general decision was rendered for the first time by the Comptroller of the Treasury on April 16, 1900 (published in Circular No. 231 of Paymaster-General's Office, April 19, 1900), in which it was decided that an acting hospital steward is a true noncommissioned officer, and is entitled to travel pay and extra pay as such, and not as a private, and when retired is entitled to 75 per cent of the pay and allowances of his grade.

In the volunteer regiments organized during the year 1899, hospital stewards (three in number for each regiment) were noncommissioned officers of the regiment, and the regulations prescribed for the organization of these regiments directed that candidates for appointment as hospital stewards should be required to produce certificates of efficiency from a reputable college of pharmacy. Experience in the summer of 1898 having shown, however, the great necessity that there should be a noncommissioned officer of the Medical Department with each regiment, who should be familiar with the preparation of reports and returns, in order that the proper medical statistics should be kept and that the enlisted men of the Hospital Corps should be properly accounted for, it was informally arranged that one of the volunteer stewards for each regiment should be secured by the appointment of an acting hospital steward of the Regular Army to that position. Experienced and capable acting hospital stewards were accordingly appointed to these positions upon my recommendation. The benefits of this course have been apparent from the orderly manner in which the records of the Medical Department in the volunteer service have been kept.

Schools of instruction.—The schools of instruction at Washington Barracks, D. C., and Angel Island, Cal., have been continued during the fiscal year, 726 men having been instructed at Washington Barracks and 692 at Angel Island. The greater part of these men have been sent to the Philippines. A school of instruction has also been established at hospital No. 3, Manila, P. I., and until the military hospital No. 1, Havana, Cuba, was given up, a training school was in successful operation at that hospital.

A large number of hospital corps men of all grades have been commended by surgeons with whom they were serving. Of many of these mention is made in the reports embodied in this volume. The chief surgeon, Department of the Visayas, reports that he never knew of a hospital corps man who failed in his duty in any way under fire. An experience with the most formidable diseases, such as yellow fever and the bubonic plague, has also shown that the men of the Hospital Corps are always ready to expose themselves with cheerfulness to dangers which are rightly more dreaded than those of the battlefield. Where so many have done well it would appear invidious to make distinctions, and doubtless many acts of heroism have never been reported to me. An amputation performed by Privates Samuel Jones and Henry Becker,[1] of the Hospital Corps, is, however, particularly worthy of note as an evidence of courageous and judicious performance of duty in an emergency, for which they had received no special training. On January 27, 1900, a certificate of merit was awarded to Private Philip M. Beyerl, Hospital Corps. On November 13, 1899, while on duty on the hospital ship *Relief*, an insane patient having eluded his attendant and jumped overboard, Private Beyerl sprang after him without a moment's hesitation, and, although the night was dark and the bay rough, succeeded in reaching the patient and supported him until a boat came to his assistance. A certificate of merit was also awarded on June 14, 1899, to Private Harry Shields, Hospital Corps, for distinguished conduct in the flood at Brackettsville, Tex. General Orders, No. 15, Adjutant-General's Office, February 13, 1900, publishes the name of one hospital steward and six privates of the Hospital Corps, whose conduct was especially meritorious in voluntarily nursing yellow-fever patients at Fort Barrancas, Fla., during the epidemic which prevailed at that post in November, 1897.

ARMY NURSE CORPS.

The number of female nurses in the Army Nurse Corps has remained approximately constant during the year, there having been 187 in the service July 1, 1899, and 210 on June 30, 1900; 165 contracts were made and 149 were annulled. The movement of troops to the Philippines has occasioned a corresponding movement of nurses, and 122 are there now, against 33 at the beginning of the year. Female nurses have recently left Honolulu and the hospital ship *Relief*, but are serving in increasing numbers on the army transports in the Pacific.

The number of nurses in the United States was temporarily increased in the autumn of 1899, but otherwise remained nearly the same, having been 65 a year ago and 60 at present. They are now stationed at the general hospitals at the Presidio of San Francisco, Cal., and Fort Bayard, N. Mex., at two post hospitals, and at the school of instruction for the Hospital Corps at Angel Island. No nurses remain in Porto Rico at present, and their number in Cuba has been reduced from 76 to 16.

The organization of the Army Nurse Corps has been steadily improved and its adjustment to the Army made more satisfactory in details. The work of the nurses continues to be highly appreciated and their services are in demand at almost all hospitals of importance.

The regulations governing the Army Nurse Corps which were published in a circular from this office June 20, 1899, approved by the Secretary of War, were reissued March, 9, 1900, with but two important changes. Appointments are now limited to citizens of the United States, this provision being waived only in the cases of those who have previously served (and then only if they have legally declared intention of becoming citizens). The leave of absence authorized, which was previously in the proportion of thirty days for each year of past service, is now thirty days in each calendar year, regardless of length of service.

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[1] Report of the chief surgeon, Department of the Visayas, p. 160.

The use of the nurses at the hospital corps schools as instructors in the preparation of food for the sick continues as reported last year, and has been most successful. The nurse at Angel Island is under contract as one of the Army Nurse Corps, but the nurse at Washington Barracks, is for local reasons, now classed as a civilian employee.

There has been no death among the nurses in service during the year.

MEDICAL AND HOSPITAL SUPPLIES.

Military emergencies, which have controlled the medical supply of the Army for several years, continue to influence the operations of the department having it in charge. Sudden and unforeseen demands, such as those made by the relief force recently sent to China, necessarily disturb the most liberal provision for known conditions, and compel the consideration of an ample margin of safety. Happily, in this instance the medical supply in Manila was sufficient, not only to provide for the troops immediately employed, but to meet the estimated wants of an increased force for a considerable period. Such contingencies, and the evident propriety of maintaining a large medical supply on the Pacific coast, have led to the enlargement, now in progress, of the medical supply depot at San Francisco, so that it may contain supplies for 100,000 men for six months. With a corresponding provision in New York, and the holding at St. Louis of supplies sufficient for 20,000 men for the same period, great capacity for issue will be insured, whether for emergency or routine supply.

New York is, and will probably continue to be, our cheapest purchasing market, and that most available for the distribution of supplies, so that it has been my aim to free the supply depot at that place as far as possible from the interruption of minor issues to posts at home, and enlarge its ability to meet calls from abroad. To this end its home territory has been restricted to the posts on Lake Ontario and the Atlantic seaboard. The number of posts, including arsenals, in this area is 52. In this way this depot has been free to deal with issues to Cuba, Porto Rico, and the larger part of the very extensive supply needed in the Philippines.

A like restriction of the near work of the San Francisco depot to the 20 posts in the departments of the Columbia and California has enabled that depot to deal satisfactorily with the issues to Alaska and the Sandwich Islands, as well as to contribute largely and quickly to an unexpected demand, such as that of the China relief expedition, and to restore withdrawals from Manila. As above noted, it is my desire to enlarge the capacity of this depot in order to give greater security in meeting emergency demands.

This narrowing of the territory of the depots at New York and San Francisco has greatly enlarged the area of supply for the depot in St. Louis, so that it now has 52 dependent posts distributed through the country from the Canadian to the Mexican border and the Gulf of Mexico, and from the Alleghenies to the Rocky Mountains. It is considered that this control of supply will prove satisfactory.

The diminution of the forces in Cuba and Porto Rico has enabled me to close several of the minor depots in those islands, so that only two remain in active operation—one of large storage in Havana and a small supply in San Juan.

The unusual military conditions existing in the Philippine Islands, the multiplication of posts and garrisons, the demands connected with an impoverished and unsanitary people, and the unfamiliarity with military restrictions and proper responsibility for public property of many of the medical officers temporarily employed have resulted in large requisitions for medical supplies from that quarter, so that it is not yet possible to determine with strict accuracy what constitutes a normal provision for troops stationed in the Philippine Islands.

It has been my practice to allow the largest possible measure of independence to medical authorities in remote spheres of action, holding them to proper accountability; but in the execution of my responsibility I have made some few reductions in the large requests from Manila. With rare exceptions the supplies asked for have been sent as rapidly as the conditions of the market, due security of inspection, and opportunity for transportation would permit. At the same time the medical supply officer at Manila has been provided with ample funds and has been authorized to purchase, in the local market, any supplies urgently needed.

The enormous quantities of standard articles of supply which have been sent to the Philippines or purchased in Manila since January 1, 1900, will be appreciated by reference to the following list, which contains a few only of the articles furnished:

Bismuth, subnitrate (3 tons)	pounds	6,250
Cathartic pills, compound	number	2,900,000
Castor oil	quarts	12,471
Chloroform, in 100-gram bottles	bottles	16,465
Ether, in 100-gram tins	tins	15,000
Petrolatum spissum (16 tons)	pounds	31,930
Quinine tablets	tablets	23,750,000
Plaster, adhesive, 30 centimeters wide	meters	15,500
Bandages, roller	number	1,680,000
Gauze, plain	yards	270,000
Beef extract, in 100-gram tins	tins	41,200
Alcohol	quarts	39,750
Brandy	do	22,000
Whisky	do	16,000
Envelopes, official, large	number	115,000
Envelopes, official, letter	do	350,000
Envelopes, official, note	do	200,000
Pens	do	294,000
Clinical thermometers	do	18,067
Towels, hand	do	84,000
Pajamas, suits	do	28,336

This list might be extended, but my desire is simply to indicate the very large supply that is required for the present unusual service conditions, and to make plain the need for continuous effort to avoid an embarrassing deficiency.

In the matter of hospital stores I have felt called upon to exercise some restraint. The quantities asked for in the Philippines have been very large, and in view of the authorized allowance of 40 cents a day for the food of sick soldiers and the readiness of the Subsistence Department to furnish these supplies for sale, I have held that they can not be properly purchased by the Medical Department except for emergencies. I was and am still apprehensive that if these hospital stores are issued freely the light diet of the sick will habitually depend upon this emergency provision and not upon the allowance made by Congress.

A new table of medical supply is contained in the revision of the Manual for the Medical Department, now issuing from the press, and it is expected that the changes made, chiefly in the addition of approved medicines, appliances, and material, as well as in an increased allowance, will result in meeting every reasonable demand and in avoiding irregular issues aside from those of emergency.

To our already extensive field equipment there has been added a very compact chest intended for the use of detachments serving in the field or independently elsewhere. The supply is calculated for a battalion and a period of six months. Three hundred and eighty-eight of these chests have been sent to the Philippines and are probably in service. Their cost is $114.81 each, including a compact operating case. The chests, five in each set, of the model of 1898 continue in service, and of these there are approximately 130 sets, also in the Philippines. The cost of each set is $477.61.

It is believed that our hospital equipment is fully abreast of every military necessity and compares favorably with that of other nations. Special requests for remedies, instruments, and apparatus are favorably considered if there is evidence that they will be helpfully employed.

The boards convened in Havana and Manila for the investigation of tropical diseases have been liberally supplied with the literature and material necessary for the prosecution of their work.

Since my last report 9 ice machines of large capacity, 3,000 to 4,000 pounds daily, have been sent to the Philippines for use in that military division, and 5 more are to be shipped as soon as finished by the manufacturers.

RECRUITING.

The total number of men examined for enlistment in the Regular Army during the year 1899 was 70,311, of whom 64,303 were white and 6,008 were colored. The number accepted was 47,899, or 681.24 out of every thousand examined. The ratio of accepted men was 677.36 for the white and 722.87 for the colored. White men to the number of 49 and colored men to that of 26.96 per thousand declined enlistment. The rate of rejection on primary examination was 273.64 among the white and 250.17 among the colored candidates, giving a mean of 271.64.

Of every thousand examined 74.56 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight; 41.43 for diseases of the eye, 38.06 for diseases of the circulatory system, 26.53 for diseases of the digestive system, 22.43 for affections of the genito-urinary system, 17 for venereal diseases, 9.61 for hernia; while 9.81 were rejected as generally unfit or undesirable, 3.74 as minors, 3.12 on account of bad or doubtful character, and only 1.32 on account of illiteracy, imperfect knowledge of the English language, or mental insufficiency.

Of every thousand of the accepted men 855.61 were natives of the United States, 41.61 were born in Germany, 34.18 in Ireland, 17.14 in England, 11.55 in Canada, 6.58 in Sweden, 4.68 in Russia, the remainder in various other countries.

Recruiting returns for volunteers are not rendered to this office.

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

During the year ending June 30, 1900, 9,718 transcripts of the identification cards of 5,318 delinquent ex-soldiers were filed among the classified descriptions of undesirable men, an average of 1.83 per man as compared with 2.06 for the antecedent period, and 438 transcripts were canceled. On June 30, 1900, there remained 43,248 transcripts, an average of 2.20 each for 19,643 delinquent soldiers whose enlistment would be contrary to law.

June 30, 1899, 161,212 identification cards were on file for recruits and 5,549 for released military convicts and soldiers discharged dishonorably or without honor. The receipts for the following twelve months were 21,504 and 1,090, respectively, bringing the totals, June 30, 1900, up to 182,716 and 6,639.

From July, 1890, the time of the first identification, to June 30, 1900, 1,819 identifications have been made; 18 in 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, 108 in 1896, 68 in 1897, 347 in 1898, 480 in 1899, and 137 during the first half of 1900.

HOSPITALS, POST AND GENERAL.

During the past year modern hospitals were completed at Fort Adams, R. I.; Madison Barracks, N. Y.; Fort Slocum, N. Y., and Fort Banks, Mass. Additional wards, kitchens, and dining rooms were added to the hospitals at Fort Ethan Allen, Vt., and Fort Porter, N. Y., and a new kitchen was added to the hospital at Fort Monroe, Va. The hospital at Mayaguez, P. R., was reconstructed, and the hospital at San Juan, P. R., was provided with new plumbing and otherwise improved. Plans and specifications were also prepared for a hospital at Santa Clara Barracks, Cuba.

New mortuaries of brick were erected for the hospitals at Washington Barracks, D. C.; Fort Wadsworth, N. Y., and Fort Crook, Nebr.

An additional ward for fifty beds and a new kitchen are in course of construction at the Army and Navy General Hospital, Hot Springs, Ark., and new hospitals are being erected at Fort Terry, N. Y.; Fort Preble, Me.; Fort Williams, Me.; Fort Strong, Mass.; Fort Leavenworth, Kans.; Fort Ontario, N. Y.; Fort Howard, Md.; Fort Du Pont, Del., and an important addition is being made to the hospital at Washington Barracks, D. C.

New quarters for hospital stewards were completed at Fort Snelling, Minn.; Fort Washington, Md., and at the Army and Navy General Hospital, Hot Springs, Ark. New quarters are now in the course of erection at Fort McDowell, Cal., and at Washington Barracks, D. C.

A general hospital or sanitarium for the treatment of officers and men of the Army suffering from pulmonary tuberculosis was established on my recommendation during the past year at Fort Bayard, N. Mex. Transfers of enlisted men suffering from this disease are made on the recommendation of medical officers of the Army forwarded through military channels. Discharged soldiers who are entitled to the benefits of the United States Soldiers' Home, Washington, D. C., are cared for at this establishment when sent by order of the board of commissioners of the Home, the expense for the maintenance of such soldiers being paid from the Soldiers' Home funds. On January 6, 1900, there were 47 patients under treatment at this sanitarium; on June 30, 83, and at the present date, October 17, 109.

The general hospital at Savannah, Ga., and the Josiah Simpson General Hospital at Fort Monroe, Va., were closed during the year, the necessity for their continuance having ceased. Besides the specia hospitals at Hot Springs, Ark., and Fort Bayard, N. Mex., there are now in service in the United States only two general hospitals—one at

Washington Barracks, D. C., and the other at the Presidio of San Francisco, Cal. The one supplies the needs of the troops serving in the eastern part of the country, and is utilized as a training school for recruits for the Hospital Corps. The other receives sick men from organizations en route to the Division of the Philippines and patients sent from the hospitals in Manila for the benefit of the home climate. The following report describes the organization and management of this establishment:

REPORT ON THE UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., FOR THE YEAR ENDING JUNE 30, 1900, BY MAJ. A. C. GIRARD, SURGEON UNITED STATES ARMY, COMMANDING THE HOSPITAL.

History of the hospital.—When the Eighth Army Corps assembled at San Francisco, and during the period of its organization, the hospital service for the troops was performed under canvas at Camp Merritt, but the climate proving unfavorable for this method of accommodation the new brick barracks at the Presidio were assigned for the purpose, pending suitable construction for hospital purposes. A general hospital was organized on December 1, 1898, in these buildings and steps were at once taken for the construction of a hospital. The plan most suited for the purpose was that of Mr. W. H. Willcox, an architect of San Francisco, and this plan was adapted to the needs of the military service under the supervision of Lieut. Col. J. V. D. Middleton, deputy surgeon-general, and Col. William H. Forwood, assistant surgeon-general, United States Army. Contracts were let early in 1899, and in May when I reported at this place I found the work well under progress. I was assigned as inspector for the Medical Department on these buildings. The location of the hospital has its advantages and disadvantages. The advantages are proximity to the city, to the post of the Presidio, and to the camps which were to shelter the troops assembling for duty in the Philippines and the volunteers returned therefrom. The disadvantages are exposure to the high winds and fogs of the Presidio, the low ground upon which it is located, and the proximity to the liquor shops adjoining the Presidio. On July 1, 1899, I was assigned as commanding officer of the hospital. I had utilized the time I was acting as inspector to make provision for the equipment of the hospital from the supply depot and for the purchase of such articles as are usually not provided by the Medical Department. Shortly after the equipment of the hospital the number of its inmates was suddenly raised from 289 to 1,040, not only filling the wards in the new hospital, but two of the brick barracks and four of the wooden barracks at the post, which in great haste had to be supplied with the necessary equipment. Since then the average occupancy of the hospital has necessitated the continued use of the buildings at the post, as the new hospital had an accommodation of only 380 beds. Pending the introduction of a steam plant, which at first when the plans were prepared had been considered unnecessary and which I applied for soon after my arrival, the buildings had to be heated by coal stoves, where pipes could be passed through ridge ventilators, which was possible in the wards and dining rooms. All the other rooms which had not been fitted with flues had to be heated by coal-oil heaters, of which 100 were provided, as they are needed in this climate in every living room almost every day of the year. The steam plant was finally allowed and is now in course of construction and will be described hereafter.

Description of the buildings.—The general plan of the hospital can best be described as a quadrangle formed by a veranda, onto which abut all the buildings, except the administration building, which occupies a greater part of the front, with on either side the buildings for male and female nurses. The five wards abut on the veranda on each side. At the lower side it is traversed by the dining room and kitchen buildings; in the center and at either corner the quartermaster, commissary, and baggage buildings on one side, and the hospital corps dining room, and kitchen on the other. The buildings are framed with redwood weatherboarding, elevated above the sloping ground from 5 feet in the upper buildings to 20 in the lower; basements inclosed with latticework, with the exception of those of the three last-mentioned buildings, which are converted into rooms.

The administration building is a two-story building intersected in the center by cross and longitudinal halls dividing the building into front and rear rooms. To the right of the front hall are the two rooms assigned to the executive officer, 13 by 16 feet each. The next room, 13 by 16 feet, is used for a medical library, and the corner room, 17 by 17 feet, for the office of the commanding officer, and the room back of this, 12 by 13 feet, for the office of the chief nurse. On the left of the entrance the first room, 13 by 16 feet, information bureau; the next room, 13 by 16 feet, officer of the day; next room, 13 by 16 feet, stenographer's room and closets for records; and the large corner room, corresponding to the commanding officer's and chief nurse's room combined, is used for the record clerks. After passing the longitudinal corridor from the front entrance we reach on the right a staircase, 4 feet 8 inches, with two landings leading to the upper story; next to that the water-closet, lavatory, bathroom, and small storeroom—the whole 21 feet long by 16 feet deep. The room next to that, 6 feet 6 inches by 16 feet, which was originally designated as clothes lockers and of no use in that capacity, was converted into a telephone room. The next room, 12 by 16 feet, is the commissary's office, and the corner room, 13 by 16 feet, the quartermaster's office. To the left of this hall the rooms are assigned as follows: The first room, 13 by 16 feet, for post-office with money-order office, established at my request by the Post-Office Department; the next room, 13 by 16 feet, as a printing office; the next as a room for the property officer and sleeping accommodations for two night clerks for the dispensary; the next to this the corner room, the dispensary, 17 feet 8 inches by 16 feet. These rooms all front on verandas, with double windows, and their doors all lead to the corridor with the exception of the dispensary, which has a door opening on the veranda.

The second story has been utilized as follows: In front of the hall a room assigned to a dentist; all the rooms to the right, seven in number, assigned to medical officers as quarters; the room over the commissary's office as photograph room, and the water-closet, lavatories, and bathrooms are over the corresponding rooms below. The rooms to the left of the hall front, five, are assigned as officers' wards. Those over the property officer's room are used as an eye, ear, and throat clinic; next to this an X-ray room, and adjoining this the pathological laboratory. Only six rooms in this building are provided with fireplaces.

To the left of the administration building, abutting on the lateral veranda, is the building for female nurses. It is a two-story structure with twelve sleeping rooms for nurses, 11 by 13 feet 6 inches each, opening on a central corridor of 8 feet. At one end is a dining room, 24 by 13 feet 6 inches, and opposite to it a scullery, 7 feet 6 inches by 13 feet, and kitchen, 10 feet by 13 feet 6 inches, and a lavatory, water-closet, and bathrooms. Opposite the bathroom is a staircase leading to the second story which has twelve rooms, 11 feet by 13 feet 6 inches each, and five rooms, 7 feet by 13 feet 6 inches each, abutting on the lavatory and bathrooms and staircase. There are no conveniences for heating this building, and coal-oil heaters have to be used until the steam plant is introduced.

At the opposite angle of the front of the hospital, abutting on the veranda, are the barracks for the hospital corps. It is a two-story building with a dormitory in each story, 36 feet 4 inches by 68 feet 6 inches. Abutting on this toward the veranda are rooms, 13 feet 8 inches by 9 feet 6 inches each, used for clerk's office, hospital steward's room, barber shop, and tailor shop, and farther toward the veranda a room with clothes lockers, 6 feet by 13 feet 8 inches, and staircase; on the opposite side water-closets, lavatories, and bathrooms with two bath tubs. The same arrangement is in both stories, except that the rooms are differently assigned.

The wards are isolated buildings, abutting as aforesaid on the veranda and variously raised from the ground as stated above. Their height is 15 feet by 24 feet by 127 feet, with 16 windows on each side. At the end nearest the veranda are, on the right side from the entrance, the linen room, 7 feet by 11 feet 9 inches, a diet kitchen, 8 feet by 11 feet 9 inches, and the wardmaster's room, 8 feet by 11 feet 9 inches. On the opposite side a bathroom, 6 feet; wash room, 6 feet, and a water-closet, 10 feet, all by 11 feet 9 inches, and separated by a hall 7 feet 6 inches. At the other end is a room 20 by 24 feet, which is used as a recreation room, and connects with the outside by a staircase. The floors of the wards are pine, with paraffin dressing. At present they are heated by three coal stoves, but when the steam plant is completed there will be a radiator underneath each window, connected with the fresh-air register, running under the floor of the ward, which receives its fresh air by suction from a shaft at the outer end of the ward. Underneath each bed is a foul-air register, which connects by a metallic duct with the foul-air duct running under the center of the ward and connecting with a brick shaft at the front end of the ward, in which, by means of steam coils, the air will be accelerated for aspiration. There are over each ward three metal ventilators reaching to the roof, with a register at the bottom, which is closed when artificial ventilation is used. For inlet the windows are provided with movable transoms 32 by 22 inches. The wards, allowing two beds between the windows, accommodate 40 patients. The wards have been named by the letters of the alphabet, commencing on the left.

The original plans of the hospital contemplated an operating pavilion, which, for the sake of economy and the improbability of much surgical work being done in this hospital, was cut off from the original plans and in place ward C was partitioned off for the purpose. The result is that ward C contains 28 beds instead of 40. The exterior end of the ward on the left side entering has a room 9 feet 9 inches by 14 feet, which was designated as a pantry, but as this ward has already a pantry, this room was converted into a dressing room for minor surgical operations. It contains a sink and shelving. Next to this is a vestibule 7 feet by 8 feet 9 inches, which has an entry on the outside staircase which, in place of communicating with the end room, gives ingress through this vestibule. Next to this is a room 10 feet by 8 feet 9 inches, which was designated as a recovery room, but it will be utilized as a sterilizing room as soon as the sterilizer lately received is put in connection with the steam apparatus. To the right on entering this section of ward C is a room 14 feet by 18 feet 9 inches, which was designated as a nurses' room, but has up to the present time been used as a sterilizing room, and on this room being transferred will probably be utilized as a recovery room. Next to this, opposite the vestibule, is a wash room, into which I had placed foot-cock washtubs. This room is intended for a final preparation room for operations. These four rooms are separated by a hall 5 feet 6 inches wide, which connects by a double door with the ward. Next to the wash room is a room 10 feet 8 inches by 8 feet 9 inches, which is designated as an etherizing room. It has, however, been used as an instrument room and for the keeping of sterilized dressings, being occasionally used for etherizing when more than one patient was to be operated on. The end of the ward has been set aside as an operating room and is 20 by 24 feet, perhaps unnecessarily large. It has a skylight 5 feet square in the ceiling and is lighted by four windows. The floor is now being tiled. It is lighted by two 4-light chandeliers and two droplights.

At the lower end of the lateral veranda is the building called the quartermaster storehouse. This was finished at first only in the second story, while the basement, which was 12 feet above the ground on its lower end, was left unfinished. It having been found that no provision had been made in the hospital for a baggage room of the patients, every one of whom arrived with some kind of a box from the Philippines, it was deemed best to set aside the upper room for a baggage room and to complete the basement for the quartermaster and commissary storeroom. The building is 70 by 24 feet. On entering it, two rooms opposite each other, 7 feet 10 inches by 16 feet, have been planned as mattress room, in which capacity they were not needed, and one room was converted into a storeroom for camp and garrison equipments and the other for ordnance. The other room, 54 by 24 feet, was arranged with 400 pigeonholes in ten movable cases for the storage of the minor articles belonging to patients, so as to leave the wards entirely without any baggage. The basement was arranged at one end with shelves and drawers for clothing, and at the other end, separated by a 5-foot passage, for commissary supplies, the plan being to make the general hospital entirely independent of the post in its quartermaster and commissary supplies. A staircase leads from the veranda to the entrance of the basement.

The dining room abuts on the lower veranda and connects with the main veranda by two verandas which intersect it at the center. The building is 158 by 28 feet. Within 24 feet of its end it has an L, increasing its size by 18 feet. The dining room proper is 122 feet 7 inches long with five ridge metallic ventilators and nine windows on each side and three at the end. It accommodates ten tables with twenty seats each. At the lower end of the dining room it is partitioned off into a pantry 8 by 16 feet, with sinks and shelving. A sideboard for dishes is built on the dining-room side against this partition. A passage 8 feet wide permits ingress from the lower veranda with double doors. The room forming the L, 24 by 30 feet, was designated as an officers' mess, but as the officers, unlike those in civil hospitals, do not eat from the hospital mess, this room was used for other purposes, and has been arranged for a chapel and reading room. It contains also a library contributed by friends of the soldiers.

Opposite the dining room, on the other side of the veranda, there abuts on to it the kitchen building, which was originally intended only to be finished on the level with the veranda floor. It was intended to have the bakery on the same floor, but finding that this would too much crowd the space the basement has been completed into a bakery, one corner being partitioned off for the 2,000-gallon heater which supplies all the rooms in the hospital with hot water. The kitchen building is 71 feet long by 38 feet 10 inches wide. On entering the building through a hall 8 feet wide there is on the right-hand side a scullery, 14 by 20 feet, with a large wooden sink and china closets, connecting with the hall and the kitchen by double doors. On the left-hand side, with its entry into the kitchen, is the kitchen storeroom of the same size, part of which was intended to be divided off into a cold-storage room. The kitchen proper, as originally planned, was to have milk, coffee, water, tea urns, steam kettles for soup, meat, vegetables, and eggs, which were cut off when the steam plant was originally disapproved. These will now be introduced. Meanwhile the cooking has been done on a French range extending the farther width of the room. Tables, dressers, shelves, sinks, and a dumb-waiter to the bakery complete the equipment of this room. It has two metallic vent cowls and is lighted by five windows on each side.

The next building to be considered corresponds in location to the baggage building at other end of the lower veranda. It was originally intended and designated "Detailed men's building." As there are no detailed men, and there was no provision made for a separate dining room and kitchen for the hospital corps, who are not living on the 40-cent ration, it was deemed best to put in additional rooms to complete this building. The floor on the level with the veranda has a dining room for the hospital corps, and the basement is divided into a kitchen for the hospital corps and storeroom for the general mess. This building is 72 feet 4 inches long by 25 feet 6 inches. It is entered through a 5-foot hall, on the right side being a lavatory, water-closet, and urinals, and on the left side a bathroom. These were left undisturbed. The dining room proper is 62 feet by 22 feet 6 inches, with two central metallic ventilators, and at the exterior end is divided off into two rooms, one for a pantry and one for dumb-waiter and service room equipped with necessary shelves.

Immediately in the rear of the main kitchen building is situated a building 85 by 23 feet, one end of which, 12 feet wide, was partitioned off as a mortuary, divided into two rooms of equal size.

The veranda on which all the buildings abut is 14 feet 4 inches and about 10 feet high, with roof sloping upward, which was originally covered with tar paper, but this having been found to be not durable has been replaced by tin. The basement of the veranda is closed by lattice panels of various heights. The outside of the veranda is inclosed with windows. The lower basement of the veranda has been found useful for storerooms, carpenter and paint shop, baggage room for the hospital corps, and has been divided off into a number of suitable apartments.

The steam plant.—As soon as I became acquainted with the climate of the Presidio I became convinced that some sort of artificial heat would be necessary to make the new hospital habitable, and I therefore urged reconsideration of the disapproval of the steam plant, which finally was approved. The use of this plant for ventilating purposes has been detailed above. In addition to this the smaller rooms will be provided with radiators on the direct method, and the dormitories of the hospital corps with direct indirect radiators and the necessary wooden aspirating flues. This steam plant by utilizing high pressure will permit the running of an ice plant, two dynamos, and the necessary laundry machinery, while the buildings will be heated by low pressure. The cost of washing done outside of the hospital has averaged $900 a month, and an equal sum was paid for electric lighting of the hospital, while the ice bill of the hospital averaged about $70 per month, and therefore this plant will effect a saving per year of $18,000 in the running of the hospital after deducting the expenses of its management:

Medical and surgical work performed during the year.—There were admitted during the year: State volunteers, 1,414; United States volunteers, 972; regulars, 2,198. Of the State volunteers, 9 died and 48 were discharged on certificates of disability; of the United States volunteers, 5 died and 104 were discharged for disability, and of the regulars, 52 died and 374 were discharged.

The following surgical operations were performed during the year, with two exceptions, all by myself:

Hernia	36	Circumcision	16
Appendicitis	13	Enucleation of glands	6
Extraction of bullets	8	Varicocele	10
Osteoplastic operations	12	Amputations	7
Empyema	2	Abscess of liver	1
Aneurism	1	Carcinoma	3
Contractures	1	Other operations	34
Abscess	3		
Enucleation of eye	7	Total	178
Hemorrhoids	18		

Of these operations 2 for hernia were performed by Col. W. H. Forwood, assistant surgeon-general, on my invitation, and 1 by Capt. H. A Shaw, assistant surgeon, United States Army.

Three cases were fatal, not, however, in consequence of the operation. One was appendicitis, which was brought after general peritonitis had set in. Another was trephining for fracture of the skull with general paralysis. (At the post-mortem the base of the skull was found fractured in addition to fractures of the dome.) The third was an exploratory laparotomy for supposed abscess of the liver; the patient did not die from the effects of the operation.

The clinical histories of these cases have been filed by hospital numbers and entered with their number on a nosological index to facilitate future investigation and research. The majority of the patients were brought by transports from the Philippine Islands, the remainder came from the volunteer camps, State volunteers on their return from the Philippines, and United States volunteers prior to their departure for foreign service.

The medical service was attended to practically by contract surgeons, who until lately were subject to frequent changes. As a rule, 1 medical officer attended to 2 wards of 40 patients each in the new hospital, and in addition these surgeons were charged with such work as attending officers' wards in the administration building, the eye and ear clinic, X-ray and photographic work, medical attendance on the hospital corps, supervision of patients' baggage room and library. The surplus of medical officers generally were assigned to duty in the various buildings occupied at the post when the capacity of the hospital proper was exceeded. The number of hospital stewards and hospital corps men employed at the hospital averaged from 130 to 150.

The number of female nurses employed at the hospital at its first occupancy was 34, which number was gradually increased to 50 and then reduced to 40 on my recommendation. The general assignment was 2 nurses for day and 1 for night duty, with such increase in detail as appeared necessitated by the number of bed cases. During the year 113 nurses have been at this hospital, of whom 69 were sent to the Pacific islands, and 10 ordered home for annulment of contract—services no longer being required—4 ordered home for annulment on account of ill health, and others transferred to various places. Thirty-six nurses have been on temporary duty awaiting orders. The conduct of the nurses has been exemplary and they have been faithful in the performance of their duties. While the number assigned appears excessive, and the nurses were not at all times occupied, it is believed that their mere presence in the wards was of great value in keeping up propriety of conduct on the part of the patients. The service for the sick was no doubt performed with greater exactness than would have been the case with members of the hospital corps, who, during the Spanish war and subsequently, were not selected with the care which could be given in peace times.

The part of this report pertaining to general organization was prepared at my request by Capt. H. A. Shaw, assistant surgeon, United States Army.

Organization of the hospital.—The administrative staff of the hospital consists of the following heads:

(1) Record officer.
(2) Property officer.
(3) Mess officer.
(4) Admitting physician.
(5) Officer of the day.
(6) Ward officer.
(7) Officer in charge of patients' property.
(8) Officer in charge of preparation of disability certificates.
(9) Officer in charge of detachment of hospital corps.
(10) Officer in charge of clinical records.
(11) Pathologist.
(12) Chief nurse.

This report is intended to give an outline of the work done in each department and the methods by which it is accomplished. The number of departments under the control of a single officer varies with the number of officers on duty. With the departments well organized and under competent stewards and clerks, the executive officer of the hospital should manage the departments of records, property, and mess, and command the hospital corps. The officer of the day is detailed by roster. One ward officer, in addition to the care of 80 to 100 patients, should take the department of patients' property; another ward officer the preparation of disability certificates and the clinical records. The pathologist for a general hospital should be selected with reference to that particular line of work. In a large general hospital his time will be fully occupied in making routine examinations of blood, urine, feces, postmortem material, etc., so that he should never be called upon for ward work or other duty which would take him away from the laboratory.

Record officer.—This officer supervises the preparation of the official papers pertaining to patients. His chief clerk is a hospital steward, who directs the work of the record office, and is assisted by clerks whose duties are as follows: One clerk in charge of the post return; 1 in charge of the report of sick and wounded; 1 in charge of the preparation of final statements and the file of descriptive lists; 1 in charge of letters-received book; 1 in charge of letters sent; 1 in charge of the preparation of the consolidated morning report of patients; 2 clerks in charge of the preparation of muster rolls, pay rolls, and clothing schedules (one of these clerks is in charge of the card index of patients' records); 1 clerk in charge of preparation of certificates of disability.

The most important single report made in the record office is the "Consolidated morning report of patients," for upon its accuracy in every detail depends the correctness of the post return, and if this report is unreliable no dependence can be placed on the official returns from the hospital. This report is made upon the following form:

Consolidated morning ward report.

U. S. Army General Hospital,
Presidio of San Francisco, Cal., ..., 1900.

	Strength.				Present and absent.		Alterations since last report.																		
		Absent.					Gains.			Losses.															
										Discharged.				Transferred.											
Wards.	Patients present.	On furlough.	Without leave.		Aggregate present report.	Aggregate last report.	Original admission.	Transfers (ward).		Expiration of service.	For disability.	By order.		To duty.	A. & N. Gen. Hospital.	Gov. Insane Asylum.	Fort Bayard.	Wards.		Died.	Deserted.	Escaped.	Discharged soldiers left hospital.	Civilians left hospital.	Vacant beds.
A																									
B																									

The data for this report come from two independent sources: First, from the ward and second, from the officer of the day. Each ward reports to the record office a 9 a. m. daily the changes which have occurred in that ward for the twenty-fou hours previous to 7.30 a. m. of that day, on a form with headings similar to those o the consolidated report, the changes being given also by name and organization.

Morning report of patients.

Ward .... 1900.

Name of ward master or nurse preparing report: ....

Strength.				Present and absent.		Alterations since last report.																		
	Absent.					Gains.			Losses.															
									Discharged.				Transferred.											
Patients present.	On furlough.	Absent without leave.		Aggregate present report.	Aggregate last report.	Original admissions.	Transfers (ward).		Expiration of service.	For disability.	By order.		To duty.	A. & N. Gen. Hospital.	Government Insane Asylum.	Fort Bayard.	Wards.		Died.	Deserted.	Escaped.	Discharged soldiers left hospital.	Civilians left hospital.	Vacant beds.

Printed directions for making up the morning ward report are posted in the ward register, as follows:

"Carry forward from previous report the number reported in column 'aggregate present report' and place this number in column 'aggregate last report.' Enter all gains and all losses in proper columns. Add total gains to 'aggregate last report,' and subtract total losses, placing remainder in column 'aggregate present report.' Enter in proper columns the number absent on furlough and absent without leave and subtract the total absent from 'aggregate present report,' placing remainder in column 'patients present.' All the above entries are to be made by reference to the ward register, which should contain all the necessary information. All changes will be reported by name and organization. Enter first original admissions, then transfers (ward), and follow with other changes in the order named in report. Every change will be headed with the designation of the gain or loss, as—

Original admissions.

1. Smith, John, pvt., E, 13th Inf.; 25; W; Mass.; 3¼; *Sheridan.*
2. Stevens, James, cpl., I, 9th Cav.; 31; C; Miss.; 10½; command.

Lost by transfer.

1. Rice, John J., to ward C.

Discharged for disability.

1. James, William C., pvt., B, 23d Inf.

Gained by transfer.

1. Wright, James J., pvt., A, 3d Art., from ward B.

On furlough.

1. Williams, George J., pvt., B, 6th Inf., till May 4, 1900.

"In the column for remarks note, in cases of 'original admission,' the age, race, birthplace, years service, and source of admission (in the order named); in cases received by transfer from other wards, the ward *from* which transferred; in cases returned to duty, whether in 'duty in United States' or 'full duty;' in cases transferred to other wards, the ward *to* which transferred; in case of death, cause and hour of death.

"When a patient is discharged from the service and remains in hospital, he should be dropped as an enlisted man and taken up on the same report as an original admission, and carried on the ward register as a discharged soldier.

"When a patient on furlough fails to return to the ward at the expiration of his furlough, he will be dropped from the column 'On furlough' and taken up in column 'Absent without leave,' with appropriate remarks as 'Smith, Thomas, private, B, 6th Infantry, from on furlough to absent without leave.'

"When a patient returns from furlough, he will be dropped from the column 'On furlough' and taken up in column 'Patients present' with appropriate remark below."

The officer of the day reports to the record office daily the names of all patients admitted for the twenty-four hours preceding 7.30 a. m. of that day, on the following form:

Admissions for twenty-four hours.

[U. S. Army General Hospital, Presidio of San Francisco, Cal.]

Ending 7.30 a. m............., 1900.

Name.	Rank.	Company.	Regiment.	Age.	Birthplace.	Years service.	Ward.	Hosp. No.
1.								
2.								

Departures are reported on a similar form.

These two reports (from the wards and from the officer of the day) are carefully compared by the clerk compiling the consolidated report, and if found to correspond the one with the other, the consolidated report is made accordingly—for instance, if the officer of the day's report shows John Smith admitted to ward A, the ward officer of that ward should report him as taken up as an "original admission," and similarly if the ward officer of ward B drops James Allen as "returned to duty," the officer of the day should report him in the list of departures. This double check on admissions and departures has been found absolutely necessary to prevent error. When the morning report is completed and signed by the executive officer and the commanding officer, it is passed to the clerk in charge of the report of sick and wounded, who enters on his register the names of patients admitted and the particulars as to those disposed of, checking each name in the column prepared for the purpose. (This clerk also enters on the officer of the day's report "Admissions for twenty-four hours" in the proper column the hospital number of each patient. This report is then returned to the officer of the day who enters the hospital number on the bed cards and index cards.) The consolidated report then goes to the clerk in charge of the card index who enters the data on the individual cards, making a check against each name and reporting any discrepancies as compared with the cards that he may observe. The morning report is next passed to the clerk in charge of descriptive lists, who obtains from it the names of men disposed of in order that he may make proper disposition of the descriptive lists.

In order to facilitate ready reference to a patient's record and also to diminish as far as possible liability to error in the keeping of the various records, the card-index system has been introduced. The complete record of each patient, so far as it pertains to medical status, pay, clothing, court-martials, correspondence, etc., is recorded on a card prepared for the purpose, properly indexed and filed.

When patients are to be discharged from the service or transferred to other hospitals, the ward officer is informed of the fact by notification from the record office on the following blank:

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal.,
............., 1900.

The following-named patients will be discharged from this hospital on............and their names will be dropped on the morning ward report of............ They will be sent in charge of the ward master to report to the officer of the day at 10.30 a. m.............with a *disposition slip* signed by the ward officer.

Surname.	Christian name.	Rank.	Company.	Regiment.	Ward.	Authority for discharge.	Signature of ward officer or head nurse, ward master.

The property officer is charged with the care and accounting of public property. The following general order has been published in regard to this subject:

PUBLIC PROPERTY, ITS CARE AND ACCOUNTABILITY.

"In order to protect the public property at this hospital from loss and unnecessary damage, medical officers will be required to receipt to this office for all property in that part of the hospital over which they have control. These receipts will be made upon a prescribed form and will be rendered when the officer first assumes charge of the property. Careful distinction will be made between medical and quartermaster property, each being receipted for on a separate blank.

"Each ward will be supplied with a property book, in which will be entered all articles of public property, proper notation being made of all articles received and all expended or lost.

"Whenever public property is issued from this office, it will be accompanied by an invoice signed by the property officer and by a receipt for the signature of the receiving officer, who will, after personally verifying the property, return the receipt to this office.

"If a transfer of property is ordered from one building to another, the issuing officer will prepare invoices and receipts in duplicate; one invoice and both receipts will be sent to the receiving officer, the other invoice to the property officer. The eceiving officer will sign both receipts, sending one to the issuing officer and one to his office. Any discrepancy will be reported.

“All property received by issue from this office, by transfer, or found in ward, as vell as all property issued by the officer, lost or destroyed, will be duly accounted or in the property book and also on the form ‘Statement of property.’ This form vill be rendered to this office on the last day of each month, showing the dates of eceiving and of disposing of all property during the month. In addition, a ‘Statement of losses’ will be rendered at the same time.

“Each ward officer will require his wardmaster to verify all public property in the vard on the 10th and 20th of each month. The ward officer will make a personal heck of the property at the end of the month. All losses of or damage to public roperty will be promptly reported to this office. So far as possible, damaged property vill be exchanged for that which is serviceable, in which case no invoice or receipts vill be exchanged. When property is turned in to this office, the property officer vill give his receipt to the responsible officer.

“Public property which has been placed in wards, offices, or other rooms of this ospital will not be removed except by direction of the commanding officer.”

The blanks used in connection with the above order are these:

Monthly statement of medical property.

Ward...... Month of............1900.

Property received.				Property disposed of.	
Date.	Articles.	No.	Date.	Articles.	No.

I certify that this statement is correct.

.................,
.................,
Ward Officer.

Monthly statement of losses of medical property.

For the month of ...., 1900. Ward ....

Date.	Articles.	No.	Articles.

I certify that this statement is correct.

.................,
.................,
Ward Officer.

The admitting physician is the officer of the day. His duties are prescribed in the ollowing general orders:

“The detail for officer of the day will be made by roster. His duties will begin at o'clock a. m., and will continue during the succeeding twenty-four hours. He is he admitting physician of the hospital, and will examine all patients admitted and ll discharged during his tour. Each patient admitted will be provided with an dmission slip signed by the officer of the day. This slip will show the name, rank, ompany, regiment, age, birthplace, and years of service, as well as the ward to vhich he is assigned. It will be given to the head nurse of the ward, and the information will be copied in the ward register and also on the next morning ward report. he officer of the day will examine the ward papers of each patient sent to him for lischarge, which should comprise (1) clinical history of patient, (2) disposition slip. Ie will see that these papers are duly signed by the ward officer, adding his name o the disposition slip as evidence that he has examined the patient and has found hat the proper papers have been sent in by the ward officer.

"The officer of the day will not be held for the correctness of these papers.

"The officer of the day will keep a list of all admissions and departures, which he will sign before 7 a. m. and send to the record office.

"The officer of the day will inspect all the wards of the hospital at least once before 7.30 p. m., and all the wards of the new hospital between midnight and reveille, receiving a verbal report from the night nurse in each ward. He will inspect the guards at the door of the administration building and at the rear of the hospital at these times, receiving their reports, noting whether or not they are familiar with their duties.

"The officer of the day will make a written report to the commanding officer in regard to the condition of the wards, the general sanitary condition in and about them, together with the number of patients admitted and discharged during the day.

"The officer of the day will be present at reveille roll call of the hospital corps on the rear porch of the administration building, receiving the report of the steward in charge. Absentees will be reported to the commanding officer.

"The officer of the day at this hospital will in future confine himself to the limits of this reservation during his tour of duty. He will be found on duty in his office between the hours of 10 and 11.30 a. m. for the purpose of inspecting patients who are sent from the hospital. Ward officers will not send to the officer of the day patients for disposition except between the hours of 10 and 11 a. m. At other hours than those above mentioned the officer of the day will be found in his office, except when attending the necessary duties of the officer of the day and those in connection with his wards. The officer of the day will not exchange his tour with another officer except by authority of the commanding officer.

"Upon the arrival of patients in wards the officer of the day will send bed cards and index cards to the ward officer who will, without delay, fill them out in all possible particulars and return them to the officer of the day.

"The greatest care will be exercised that the spelling of names, the designation of organizations, and all other entries on the cards be correct in every particular."

The "Admission slip:"

Admission slip.

U. S. A. GENERAL HOSPITAL, PRESIDIO, S. F., CAL.

.............1900.

Surname.	Christian name.

Rank.	Company.	Regiment.	Age.	Race.

Birthplace.	Years service.	Source of admission.

The head nurse, ward......, will admit this patient. The above data will be entered on the ward register and also on the index card, which will be immediately sent to the Officer of the Day.

....

Officer of the Day.

The "Disposition slip:"

Disposition slip.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco,............1900.

Surname.	Christian name.

Rank.	Company.	Regiment.

This patient has been discharged from ward......this date by reason of:

(Enter below method of disposition.)

....

....

Diagnosis...

....

....in line of duty—Yes or no.

.................,
Ward Officer, Ward......

I certify that I have identified this patient and that I have received the required records from his ward.

.................,
Officer of the Day.

This slip will be made out for every patient discharged from the hospital. The patient will be sent to the officer of the day, accompanied by the ward-master.

The "index card" referred to in the above orders is for file in the office of the officer of the day. This is the office to which visitors are sent with various inquiries, and the file of cards is a sort of bureau of information for visitors:

Surname.	Christian name.	Ward.

Rank.	Company.	Regiment.	Age.	Race.	Hosp'l No.

Birthplace.	Years service.	Date of admission.	Date of disposition.

Source of admission.	Method of disposition.

Name and address of nearest relative or friend.

....

....

These cards are filled out in the ward and not in the office of the officer of the day for the following reason: Patients are usually received at this hospital in large numbers and at comparatively infrequent intervals. If the work of carding them is divided up among twelve or fifteen wards, a complete file of admissions can be obtained in a very short time, and this is an important consideration in a hospital near a large city, where visitors come in crowds with each arriving transport, asking for information.

The "bed card" for each patient is filled out in the ward immediately after his arrival, and is sent at once to the officer of the day, who enters the hospital number and returns it to the ward.

U. S. ARMY GENERAL HOSPITAL.

PRESIDIO OF SAN FRANCISCO, CALIFORNIA.

Ward...... Bed No...... Hospital No......
Name ....
Rank ....Co......Regt ....
Admitted ....
Discharged ....

The duties of the guard are prescribed in the following general order:

"1. The guard on duty at the administration building will confine himself to the immediate vicinity of the front door. He will refuse admittance into the hospital of all unauthorized persons. Visitors will be taken to the officer of the day to receive a pass before being allowed to leave the administration building. The guard will not allow patients to leave the hospital without a pass. All enlisted men returning from pass will enter the hospital by the door of the administration building and will surrender their passes to the guard, who will note the hour of return and turn in the pass to the officer of the day.

"The guard on duty at the rear of the hospital will be found in the immediate vicinity of the boiler room when not on other duty connected with this detail. He will keep the boiler in good working order and the room clean. At night, between 6 p. m. and 6 a. m., he will make rounds at least once every two hours, trying all doors in the buildings in rear of Wards E and F, and will see that the windows and doors are closed and have not been tampered with. He will lock the gates of the hospital at retreat and unlock them at reveille, and will prevent patients and other persons from leaving the hospital in any unauthorized way.

"Guards will keep a sharp lookout for fire and will at once notify the officer of the day in case of its discovery."

The ward officer, in addition to his professional duties, makes the following reports:

1. A "Morning report of patients," on the printed form already referred to.
2. A weekly report on the following form:

U. S. Army General Hospital,
Presidio of San Francisco, Cal.,
.............., *1900.*

Ward ....

The following-named enlisted men are, in my opinion, fit subjects for discharge or transfer, as noted below:

Surname.	Christian name.	Organization.	Remarks: State whether discharge on surgeon's certificate of disability, transfer to Fort Bayard, or transfer to Hot Springs is recommended.

.................., *Ward Officer.*

NOTE.—This report will be made at 10 a. m. on Monday of each week to the executive officer. If the ward officer has no case for such disposition, he will so report on this form. Form 1-73.

3. A "Monthly statement of property" and "Statement of losses" on the prescribed forms.

He keeps the following records in his ward:

1. "Register of patients." This shows on the successive pages of a book from day to day the names of each patient in the ward, the organization to which he belongs, the date of admission, and upon his departure from the ward the method of disposition.

2. A "clinical history" of each patient. The following circular has been issued regarding the preparation of this history:

"Ward officers will exercise especial care that the form for the clinical record be complete before sending it to the office for file. When a patient leaves the hospital, there should be a clear and concise history of the case, giving dates as nearly correct as can be obtained, such for example as the date of arrival in the Philippine Islands, of any attack of illness after arrival with its duration, the date of onset of the present attack, that of departure for the United States, etc.

"After admission to this hospital, notes will be entered on a sheet headed, 'Progress of the case,' at sufficiently short intervals of time, from a day to a week, according to the case, to give at any point in the course of the disease a comprehensive exposition of the conditions present. Printed forms are provided for clinical histories, showing temperature, pulse, and respirations, and for pathological reports, such as examination of sputa, feces, urine, etc.

"When a man is transferred from one ward to another, the ward officer making the transfer will make the note in the 'Progress of the case,' 'Transferred from ward ...... to ward ......,' and append his signature.

"When a man ceases to be an inmate of the hospital, the ward officer will see that the date and manner of disposition and the condition of the patient at this time are entered on the form for clinical history and that the form is signed; only the signature of the officer last in charge should be found on this sheet, that of others who may have attended the case appearing under a note of transfer."

The diagnosis of each patient is reported to the record office, as soon as it is established, on the following form:

Diagnosis card.

Ward...... Hospital number......

Surname. Christian name.

....

Rank. Company. Regiment.

....

Diagnosis or complication. (Erase either not required.)

In line of duty—Yes or No...... ....
Ward Officer.

Date............1900.

NOTE.—The diagnosis, signed by the ward officer, will be reported on this slip to the record office as soon as established. This form is also used for any change in diagnosis or any complication, which should be reported at its occurrence.

3. An "order book," in which the ward officer enters all orders, prescriptions, etc., pertaining to patients.

4. Report of the night nurse.

5. "Ward property book." In this book is kept a record of all articles of medical and quartermaster property for which the ward officer is responsible, due account being made of all property received and all disposed of during each calendar month, when a return is made to the property officer on the form "Statement of property."

When a patient is transferred from one ward to another, the following blank is used:

Transfer slip.

U. S. A. General Hospital,
Presidio, California, ..., 1900.

Surname.	Christian name.

Rank.	Company.	Regiment.

This patient will be *transferred* from ward ...... to ward ....

................,
Ward Officer, Ward ....

Received:

................,
Head Nurse, Ward ....

This slip, signed by the ward officer, will be sent with the patient to the new ward, where it will be signed by the head nurse; after entering the data on the ward register, she will send the slip without delay to the officer of the day.

The officer in charge of the surgical ward keeps a record of each surgical operation in a book prepared for the purpose.

Each ward officer has the following assistants: One head nurse and two or three assistant female nurses; one wardmaster; one ward attendant (male) for day duty; at night, one female and one male nurse. This is the usual allowance for a ward of 40 beds.

The head nurse is responsible for the proper execution of all orders she receives regarding the care and treatment of the patients in her ward. She divides the patients into sections and appoints an assistant nurse for the care of these. She prepares the morning ward report of patients and has charge of the clinical histories of the cases.

The duties of the wardmaster are prescribed in the following general order:

"1. The wardmaster is charged with the care of the public property in the ward. In order to prevent loss, he will become familiar with the articles of property with which he is charged by reference to the ward-property book, and will on the 10th and 20th day of each month make a check of all property in the ward, reporting to the ward officer all articles missing and all in excess, as shown on the property book.

"Public property in the tea kitchen will be under the direct control of the head nurse of the ward, who will hold the key of the room and will report any loss of property to the wardmaster. She will be present on the days when the property is checked, assisting the wardmaster in locating it. The key of the tea kitchen will at night be held by the night nurse.

"The wardmaster will keep in his possession the key of the linen room, except when he is necessarily absent from the ward; he will then turn it over to the head nurse or night nurse, as the case may be. The room will be kept locked at all hours.

"The wardmaster will take charge of all clothing not in use belonging to patients in his ward. This he will take to the property room, receiving a receipt therefor from the officer in charge. Overcoats of convalescent patients will be kept in the linen room of the ward, each being tagged with the name and organization of the owner. Care will be taken that no overcoat is removed by anyone not the owner.

"The wardmaster will be held responsible for the police and sanitary condition in and about his ward. To this end he will, with the approval of the ward officer, detail patients for such light duty as they are able to perform.

"The wardmaster will present himself in the diet kitchen in time to take the diet orders to his ward. He will before taking away his carriage check its contents with his retained list of orders. He will, under the supervision of the head nurse and with the assistance of ward attendance, distribute the food.

"In case of the death of a patient in the ward, the wardmaster will immediately secure all his effects, including those in property room, making an inventory of them, which will be verified and signed by the ward officer. The articles will then be stored in the linen room until final disposition is made.

"Ward linen which becomes soiled during the day will be collected in the laundry room under the ward. The wardmaster will make a list of all these articles on Form 10, taking them to the laundry building between 9 and 9.30 a. m., where they will be exchanged by the steward in charge for the same amount of fresh linen. All articles which have become worn and unfit for use will be sorted out and reported to the steward in charge as unfit for service."

An officer is detailed in charge of patients' property. Patients' private effects are kept in a storeroom with lockers prepared for the purpose. Each patient on depositing property receives a tag showing his name, organization, and a brief description of the property. The duplicate of this tag, with corresponding number, is filed in an index in the care of the storekeeper.

When a patient dies in hospital, the ward officer collects his effects and makes an inventory of them, which he sends to the executive officer on a prescribed form.

The personal effects of deceased soldiers are kept in the ward property room. When these are to be packed for shipment, the following blank is used for the protection of all concerned:

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal.................1900.

The ward officer of ward......will turn over all the effects of.................
....
deceased, to the man in charge of the property room, who will check them from list furnished herewith and box them for shipment to ....
....
at ....

..................,
Capt. & Asst. Surgeon, U. S. A., Executive Officer.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal.................1900.

I have this day boxed the effects of the above-named man and find them to agree with the list furnished me.

..................,
Private, Hospital Corps, U. S. A.

The necessity of exercising the greatest care in the preparation of certificates of disability is so apparent that an experienced officer has been appointed to examine carefully each case recommended for discharge and then to supervise the completion of the papers of suitable cases. Ward officers make recommendations for discharge on surgeon's certificate of disability on a form already shown.

The officer in charge of the detachment of the Hospital Corps is responsible for the discipline of his command. His duties correspond largely to those of a company commander.

The officer in charge of clinical records inspects the record of each patient on the day following his discharge from the hospital, and when necessary returns it to the ward officer for immediate correction. The record is then filed with the others in numerical sequence of hospital numbers, regulars and volunteers being in separate files.

The pathologist keeps in books prepared for the purpose a record of every examination made in the laboratory, making a duplicate report to the ward officer in each case. He makes a weekly report to the commanding officer of the hospital regarding the work done in the laboratory.

The following regulations in regard to the work of the bacteriological laboratory have been published:

"*Examination of blood.*—The blood of every patient admitted to this hospital is to be submitted to the pathologist for examination. If nothing abnormal is found, the first examination will be considered sufficient unless a request is made for another by the pathologist or by the medical officer in charge of the case. Where the malarial plasmodium or any other abnormal condition is found, the blood is to be reexamined as often as the medical officer in charge of the case considers necessary.

"*Examination of urine.*—The urine of every patient admitted to the hospital is to be examined at least once; in cases which show no pathological condition of the urine, and which are not bed patients, the urine is not to be again examined unless requested by the pathologist or by the medical officer in charge. In pathological urine, and in the case of all bed patients, the urine is to be examined once a week unless in case of emergency a more frequent examination is considered necessary by the medical officer in charge of the case.

"*Examination of sputum.*—The sputum of every case showing pulmonary symptoms or in which a diagnosis of tuberculosis has been made, will be submitted for examination as often as the medical officer in charge of the case directs, or the pathologist requests.

"*Examination of feces.*—The feces of every case suffering from chronic diarrhea or dysentery will be submitted to the pathologist for examination at least once, and as often thereafter as he or the medical officer in charge may direct.

"*Use of examination blanks.*—A combined pathological blank which is attached to the clinical history is to be filled out for the first examination of each case; requests for reexamination should be made out upon a separate blank furnished for that purpose, which may be obtained at the laboratory.

"Wherever possible the clinical diagnosis will be verified by the pathologist, as in cases of pulmonary tuberculosis, malaria, amœbic dysentery, etc., and wherever such confirmation can not be obtained the fact will be stated on the diagnosis card.

"The pathological blank must be filled out and be accurate in every detail before being sent to the pathologist, special attention being paid to remarks concerning previous attacks of typhoid or malarial and as to clinical diagnosis and prominent symptoms. The report, when returned to the ward officer, should be filed with the clinical history.

"Specimens of urine, feces, sputum, etc., must be accompanied by the proper slip securely fastened to the bottle so that identical cases may be assured; these will be sent to the laboratory not later than 11 o'clock a. m., except in cases of emergency.

"All cases entering this hospital with a diagnosis of malarial fever, malarial cachexia, or in which malarial infection is suspected, should not have the blood examined until at least a week has elapsed after entry, unless active symptoms are present before that time. Quinine should not be administered to any such case until the blood has been examined and the diagnosis confirmed by the pathologist, except in pernicious cases, or where for some complication quinine is necessary.

"The chief nurse is charged with the duties usually devolving on the superintendent of nurses in civilian hospitals. She renders to the executive officer a daily report, 'Morning report of female nurses.'"

*Morning report of female nurses.**

U. S. Army General Hospital,
Presidio of San Francisco, Cal., ...1900.

Present and absent.								Alterations since last report.										
Present.			Absent.					Gain.			Loss.			Duties of nurses.				
For duty.	Sick.	Total.	With leave.	Without leave.	Total.	Total present and absent.	Present and absent last report.	By contract.	By transfer.	Total.	By annulment of contract.	Transferred.	Total.	Chief nurse.	Ass't C. nurse.	Ward duty.	Special duty.	Not assigned.

....

Chief Nurse.

*All changes to be accounted for by name in this space, together with number, source, and date of order.

The mess department of the general hospital is under the supervision of a mess officer, who has under his immediate charge 1 hospital steward, 1 acting hospital steward, 4 civilian employees, and 27 privates of the Hospital Corps. It includes all kitchens and dining rooms for patients and for the Hospital Corps, the bakery, and supply storeroom.

Diets for patients are prepared in two kitchens according to an established bill of fare (General Orders, No. 28, July 13, 1900, being the latest diet table formulated for use at this hospital). In addition a daily order list of special diet with a supplementary list is provided for the use of ward surgeons for special cases. Copies of full and light diet table, special diet, diet order, and daily order lists are appended.

The following full and light diet table has been adopted as the standard of diet; it displaces a diet table of earlier date, a change in the table having been found advisable:

GENERAL ORDERS, No. 28.

UNITED STATES ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal., July 13, 1900.

The following full and light diet tables are hereby ordered for this hospital and will be adhered to as far as practicable. Deviations must be reported by the cook to the officer in charge of the kitchens. General Orders, No. 21, December 28, 1899, is hereby revoked.

FULL DIET.

Breakfast.	Dinner.	Supper.
Sunday.		
Oatmeal and milk. Ham and eggs. Bread and butter. Fruit. Coffee.	Vermicelli soup. Roast veal, sage dressing, or Turkey or chicken and dressing. Stewed peas. Mashed potatoes. Farina pudding. Fruit. Bread and butter. Coffee.	Veal stew or boiled ham. Apple sauce. Cake. Bread and butter. Tea.
Monday.		
Germea and milk. Beefsteak. Fried potatoes. Bread and butter. Fruit. Coffee.	Roast beef. Mashed potatoes. String beans. Tapioca pudding. Bread and butter. Fruit. Coffee.	Codfish balls or hash. Bread and butter. Pickles. Jam. Sweet crackers. Prunes. Tea.
Tuesday.		
Oatmeal and milk. Sausage. Fried potatoes. Bread, butter, coffee. Fruit.	Vegetable soup. Baked pork and beans. Baked tomatoes. Bread pudding. Bread, butter, cocoa, fruit.	Fried liver and bacon. Corn bread and sirup or Biscuits. Bread, butter, tea. Fruit.
Wednesday.		
Milk toast. Beefsteak. Bread, butter, coffee. Fruit.	Roast mutton with dressing. Mashed potatoes. Corn or fresh vegetables. Chocolate pudding. Fruit. Bread, butter, coffee.	Mutton stew. Pickles. Sweet crackers. Bread, butter, tea. Peach cobbler.
Thursday.		
Germea and milk. Hash. Bread, butter, coffee. Fruit.	Oyster soup. Corned beef and cabbage. Boiled potatoes. Radishes. Rice pudding. Fruit. Bread, butter, coffee.	Sliced roast beef. Macaroni and cheese. Preserves. Bread and butter. Tea.
Friday.		
Oatmeal and milk. Bacon and eggs. Bread, butter, coffee. Fruit.	Baked fish with sauce. Plain boiled potatoes. Fresh salad. Farina pudding. Fruit. Bread, butter, cocoa.	Salmon salad. Potato salad. Apple sauce. Ginger crackers. Bread and butter. Tea.
Saturday.		
Germea and milk. Beefsteak. Fried potatoes. Bread, butter, coffee. Fruit.	Roast beef, veal, or pork. Mashed potatoes. Hot slaw. Cauliflower. Bread pudding. Bread, butter, coffee.	Baked hash or stew. Stewed prunes. Assorted cakes. Bread and butter. Tea.

LIGHT DIET.

Sunday.		
Oatmeal and milk. Soft boiled eggs. Milk toast. Coffee.	Rice soup. Farina pudding. Coffee.	Milk toast. Cup custard. Tea.
Monday.		
Germea and milk. Milk toast. Boiled eggs. Coffee.	Plain tomato soup. Bread pudding with lemon sauce. Coffee.	Farina mush and milk. Sweet crackers. Jelly. Toast. Tea.

LIGHT DIET—Continued.

Breakfast.	Dinner.	Supper.
Tuesday.		
Oatmeal and milk. Boiled eggs. Coffee.	Barley soup. Tapioca pudding. Cocoa.	Biscuits or corn bread. Maple sirup. Boiled rice. Milk toast and tea.
Wednesday.		
Oatmeal and milk. Soft boiled eggs. Coffee.	Consomme vermicelli. Cornstarch pudding. Vanilla sauce. Coffee.	Sweet crackers. Jam. Milk toast. Tea.
Thursday.		
Germea and milk. Boiled eggs. Coffee.	Oyster soup. Rice pudding. Coffee.	Macaroni and cheese. Milk toast. Maple sirup. Tea.
Friday.		
Oatmeal and milk. Boiled eggs. Milk toast. Coffee.	Fish chowder. Farina pudding. Cocoa.	Tapioca pudding. Milk toast. Ginger crackers. Boiled eggs. Tea.
Saturday.		
Oatmeal and milk. Boiled eggs. Coffee.	Vermicelli soup. Sago pudding. Coffee.	Germea mush. Assorted cakes. Jelly. Milk toast. Tea.

By order of Major Girard:

C. C. COLLINS,
First Lieutenant and Assistant Surgeon, U. S. A., Executive Officer.

In addition to the regular diet table a special diet list is provided for use of ward surgeons for cases requiring this class of diet; it also contains a list of broths intended for liquid diets.

Daily order list of special diet.

U. S. A. GENERAL HOSPITAL,
Ward ...... *Presidio of San Francisco, ..., 1900.*

	B.	D.	S.			
No. of light diets						
No. of full diets..........................						
Stewed chicken						
Chopped beef..........................						
Steaks						
Mutton chops............................						
Baked potatoes						
French-fried potatoes						
Saratoga chips...........................						
Creamed potatoes						
Baked apples						
Wine jelly						
Cup custard						
Milk toast						
Poached eggs.............................						
Coffee						
Tea						
BROTHS.						
Beef broth.................................						
Mutton broth..............................						
Chicken broth.............................						
Consomme broth						
Oyster broth..............................						

....
Ward Officer

Accompanying the special diet list ward surgeons present a diet order, showing the number of diets in ward in classified order. This order also requires the number of loaves of bread needed for patients dieting in ward to be stated, in order to prevent any shortage as well as an excess of bread being sent to the wards.

Diet order.

Ward ...., 1900.

Liquid diets ......

Special diets ......

Light diets {In ward. / In mess hall.

Full diets {In ward. / In mess hall.

	Breakfast.	Dinner.	Supper.
Number of loaves of bread required for diets in ward			

Form 55.

....
Ward Officer.

The articles required by wards on the daily order list include all such as need no preparation in the diet kitchen. They are issued direct, on the order of the ward surgeons, from the mess storeroom.

Daily order list.

Ward ......
No. of patients ......

U. S. A. General Hospital,
Presidio of San Francisco, ..., 1900.

Articles.	Quantity.	$	Cts.	Articles.	Quantity.	$	Cts.
Apples, fresh..........No..				Nutmegs ....oz..			
Apricots...............cans..				Oatmeal, H. O.........pks..			
Arrowroot ....tins..				Oranges ....No..			
Bananas ....No..				Oysters, fresh ....tins..			
Beer ....bots..				Oysters, cove.........cans..			
Beef extract...........tins..				Peaches..............cans..			
Biscuits, assorted .cartons..				Pears ....cans..			
Catsup.................bots..				Pepper ....tins..			
Chocolate..............lbs..				Pickles...............bots..			
Clam bouillon ....bots..				Pine apples ....cans..			
Cocoa ....lbs..				Salt....................lbs..			
Corn starch ....pkgs..				Sardines..............tins..			
Crackers, sweet ....lbs..				Sauce, cranberry ....tins..			
Crackers, soda.........box..				Sauce, Worcestershire.bots			
Crackers, snowflake..box..				Sugar, granulated ....lbs..			
Eggs....................doz..				Syrup.................tins..			
Farina ....lbs..				Syrup, maple ....tins..			
Ginger ale ....bots..				Tea, E. B..............ozs..			
Ginger snaps...........lbs..				Vanilla extract......bots..			
Grapes ....baskets..				Vinegar ....qts..			
Honey ....jars..				Water, mineral, Shasta bots			
Horse-radish.........bots..				Waters, mineral, Apols.bots			
Jam ....glasses..				Electro silicon.....boxes..			
Jelly ....glasses..				Fly paper ....sheets..			
Jelly, currant ....tins..				Gold Dust...........pkgs..			
Lemons ....No..				Lye ....cans..			
Lemon extract ......bots..				Matches ....boxes..			
Milk, condensed .....tins..				Soap, Castile ....bars..			
Milk ....gals..				Soap, common ......bars..			
Milkine...............bots..				Soap, Ivory...........bars..			
Mushrooms..........cans..				Sapolio ....cakes..			
Mustard, French.....bots..				Melons ....No..			

....
Ward Officer.

Fresh fruits, apricots, peaches, plums, pears, berries, etc., will be furnished on this order, as required, during season. Orders for berries must be given 24 hours in advance.

This blank will be filled out each day with number and quantity of various articles wanted and will be sent to the steward in charge of the storeroom.

There are two kitchens for patients. The kitchen at the general hospital contains a large double French range for cooking, a large hot water tank is connected to it, giving the kitchen and scullery connected therewith a supply of hot water independent of source of general supply for the hospital. A diet pantry and storeroom is attached, and an elevator, recently added therein, conveys bread from the bakery below, as required for use in this kitchen and dining room. A number of improvements are now being made, by the installation of a complete set of steam kettles for meats and vegetables and a set of urns on a steam table for coffee, tea, hot milk, and water. In the vegetable and meat basement connected with this kitchen a cold storage room has recently been added which will enable the hospital to preserve its foods at a moderate cost. All diets that may be required for patients (full, light, and special) are prepared in this kitchen. They are sent to the wards in special rubber-tired carts designed for this purpose. The food being placed on trays and covered with vessels, a door being provided in each cart, further prevents loss of heat from food while being conveyed from kitchen to ward.

An acting hospital steward is in immediate charge of the kitchen and dining room connected therewith, and a force of 9 men, 7 privates of the Hospital Corps, and 2 civilians are employed. Their duties are as follows: The chief cook cuts all meats and generally supervises the preparation of all foods. He requires from the storeroom each morning before 9 o'clock the articles of food wanted for the next twenty-four hours. Second cook makes puddings, custards, broths, etc., and prepares all light diets. Third cook prepares all meats and potatoes and assists in general cooking at range. Fourth assistant prepares vegetables, does broiling of steaks, and attends to short orders. Fifth assistant prepares coffee, tea, or cocoa; also attends to policing and care of vegetable storeroom and carries fuel for ranges. Sixth and seventh assistants are pan and dish washers at sink. Eighth assistant, general police and at sink; attends to police of woodwork and window cleaning, also assists in the preparation of vegetables. Ninth man in charge of diet pantry; consolidates diet orders from wards to special blanks for the information of the chief cook in preparing diets; keeps accounts of articles of food used from diet pantry; reports to chief cook articles of food required in diet kitchen each day; supervises the placing of food in ward carts, being responsible that no error occurs, also care and police of kitchen storeroom.

The forms below are those used in kitchen. The daily order list is used as a requisition on mess storeroom for such supplies as are required during the day. On the diet calendar is copied all data from the diet orders and special diet lists from each ward, with the object of giving the chief cook the orders for the day in consolidated form for ready reference.

Daily order list, diet kitchen.

U. S. ARMY GENERAL HOSPITAL,
Total No. of diets ...... *Presidio of San Francisco, ..., 1900.*

Amounts.	Articles.	$	Cts.

Diet calendar for kitchen.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal., ..., 1900.

Wards.	Liquid.	Light.	Full.	Special.	Mess.	No. of patients.
A						
B						

In the patients' dining room and scullery connected therewith, five privates of the hospital corps and as many convalescent patients as may be required, are employed. On account of distance of kitchen from dining room and the size of the dining room tself, it is desirable to have two men wait at each table; this to avoid any delay in supplying the wants of patients. The food is brought from the diet kitchen to the dining room in carriers, and is then distributed. The dining room contains 10 tables, with a capacity of 20 patients to each table; the number of tables could be readily increased to 14 should the requirements of the hospital necessitate this increase. Hours for meals are as follows: Breakfast, 7.30 a. m.; dinner, 12.30 p. m.; supper, .30 p. m. The doors of the dining room are opened at the sounding of mess call. Each patient as he passes in presents a meal ticket to an attendant stationed at the door for this purpose. These tickets are counted and the wards checked after each meal. The number of tickets received from each ward is entered on the attached form, which is then compared with the number of patients reported for mess hall on the diet orders of the respective wards. A check is thus maintained and the surreptitious feeding of expatients and others, a standing evil which is always to be contended against, is prevented.

U. S. A. GENERAL HOSPITAL.

PRESIDIO OF SAN FRANCISCO, CAL.

Date............1900.

BREAKFAST
DINNER
SUPPER

Indicate proper meal by crossing off the other two.

A		F	
B		G	
C		H	
D		I	
E		J	

I certify that this statement is correct as showing number of patients from each ward fed in dining room for this meal.

....
Lance Actg. Steward U. S. A., in charge of Dining Room.

This slip to be turned in to the mess office after each meal.

The kitchen for the patients treated at the brick and wooden barracks, used as adjuncts to the hospital proper, is a company kitchen converted to use of the hospital. Food for 75 to 200 patients is prepared here. Its use as a diet kitchen is not thoroughly satisfactory; the cook range being too small for the requirements, as well as the kitchen itself. Only articles of full diet are prepared here. In it one civilian as cook and three privates of the hospital corps are employed. The cook is assisted at the range by a private of the hospital corps; two additional privates of the hospital corps attend to the general policing of the kitchen and basement connected therewith, the preparation of all vegetables and washing of dishes in use in the kitchen. They are assisted by such convalescents as may be required from time to time. One private of the hospital corps is in charge of the dining room; to assist him in his duties a number of convalescent patients are daily detailed. A convalescent meal ticket is used at this dining room with the same check system as at the new hospital.

The bakery employs one civilian as chief baker, with a salary of $50 per month, and one private of the hospital corps. All bread consumed by patients, hospital corps and female nurses, is made at the hospital bakery. Since its opening, August 10, 1899, 120,720 loaves of bread, at an average cost of 1.36 cents per loaf, have been baked and issued. Bread is issued from 7.30 a. m. to 8.30 a. m., and from 3.30 p. m. to 4.30 p. m. Issues are made by the baker on an order signed by the man in charge of dining room or kitchen. They are turned in to the mess storeroom each evening by the chief baker, who renders a report at this time on the amount of flour used and number of loaves of bread baked and issued during the day. Supplies are furnished to the bakery from the subsistence funds for patients, from the hospital corps and female nurses, in amounts proportionate to the cost of bread consumed by each organization. No savings are made from flour in bakery, and there are no bakery expenses except those for actual manufacture of bread, the civilian baker employed being paid by the Medical Department.

To supply the diet kitchen a general subsistence storeroom is kept and is under the immediate charge of the mess steward. All subsistence supplies for kitchens and wards are received and issued here. One lance acting steward and two privates of the hospital corps are employed in connection with this storeroom. A market wagon makes daily trips to the city for butter, eggs, and fruit. Supplies are purchased from the commissary of the general hospital and from various firms in San Francisco as required.

Bids are requested from firms for the various articles needed at short intervals. The supplies are received and checked from the bills delivered by merchants and at the close of each day are entered upon a daily report of expenditures, said report showing the total amount expended for the day.

Daily report of expenditures for mess.

U. S. ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL.

Ending .... 19..

Articles.	Quantity.	Price.	Total.	Remarks.
Beef				
Veal				
Mutton				
Pork				
Milk				
Ice				
Chicken				
Bread				
Commissary of subsistence				
Sum total				

Form 54.

....

Hospital Steward, U. S. Army.

A morning report is prepared showing number of patients in hospital during day, and the allowance for same; a balance is then struck between the daily allowance and expenditures.

Morning report, mess U. S. Army General Hospital.

PRESIDIO OF SAN FRANCISCO, CAL., ... 19..

Patients on diet.	Remaining last report.		Financial statement.	Remaining from last report.	$	cts.
	Gained.			Allowance for current day.		
	Lost.			Total credit.		
	Total remaining.			Expended.		
Amount allowed at 40 cts. per man per day.				Balance remaining.		

Remarks:

Form 53.

....

Hospital Steward, U. S. Army.

The supplies received for the day are then entered on an abstract of receipts, which is completed at the termination of each month. This abstract contains printed headings of all articles likely to be used in the hospital and ruled for daily entries.

Abstract of purchases of food for the sick in the U. S. Army General Hospital, Presidio, S. F., Cal., for the month of ....

Date of purchase.	Apples.	Apples evaporated.	Allspice.			Bacon.	Baking powder.	Barley, pearl.	Bay leaves.	Beans, lima.	Beans, navy.	Beef.	Biscuits, assorted, tea.	Brains, calf.
	Box.	*Lbs.*	*Lbs.*			*Lbs.*	*Cans.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Tins.*	*No.*
On hand to be acc't for														

Certain articles of diet not requiring preparation (milk, crackers, jellies, etc.), are issued to wards direct from this storeroom. Milk is required for by wards, direct to the storeroom on daily order lists. As these lists are received in the storeroom the amount of milk asked for thereon is entered in a designated column on a form "daily milk account," the total amount plus a small extra quantity for emergencies being taken.

Daily milk account.

U. S. ARMY GENERAL HOSPITAL,

Presidio of San Francisco, Cal., ..., 1900.

Wanted.		Delivered No. of gals.			To whom delivered.
Ward.	No. of gals.	a. m.	p. m.	Total.	Signature of person receiving milk.
A					
B					

Issues are made on daily order lists signed by ward officers who designate the articles required for their patients. The number of patients in the ward is entered on the list. After issue the price of each article is entered and the total cost of issues with the number of patients for whom required entered on a card bearing name of ward and which has daily entries of cost per ward and number of patients therein for each month. The cost of articles issued to kitchens is also charged daily against each kitchen.

Articles after issue are entered on an abstract of issue roll which is completed and compared with the abstract of receipts on the last day of each month. An inventory of supplies on hand is then taken and the account closed for the month.

Abstract of issues and expenditures of food for the sick in the U. S. Army General Hospital, Presidio, S. F., Cal., for the month of............

Date of issue.	Apples.	Apples, evaporated.	Allspice.			Bacon.	Baking powder.	Barley, pearl.	Bay leaves.	Beans, lima.	Beans, navy.	Beef.	Biscuits, assorted tea.	Brains, calf.	Butter.
	Box.	*Lbs.*	*Lbs.*			*Lbs.*	*Cans.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Tins.*	*No.*	*Lbs.*
On hand to be acc't for..															

Experience has shown that under a system of fixed-diet table, special-diet table, and extra-order lists for ward use it is necessary to maintain a storeroom, keeping therein at least three days' supply of such nonperishable articles as may be required. Without such a storeroom a sudden contraction or expansion in the number of patients causes a financial stringency. The amount allowed, 40 cents per patient, is not sufficient for a sudden increase of patients requiring special diets, unless the regular-diet table is reduced at each influx; likewise it is not sufficient if the number of patients drop to 200 or below with a large number of special diets remaining as is usual. To obviate a continual change of diet tables, thereby enabling the maintaining of one standard of diet, a storeroom with supplies for 500 patients for three days, must be maintained.

A storeroom renders an exact account of stores received possible. The receipt of stores direct into kitchens for immediate use is prone to cause confusion and errors and is detrimental to any attempt to systematize the accounts of a mess intelligibly.

The Hospital Corps is fed from a separate kitchen and a separate dining room. Four privates of the Hospital Corps are employed in the kitchen, one as cook, one as assistant cook, two as general police and in the preparation of vegetables. The dining room for the Hospital Corps is above the kitchen, the food being sent to dining room from kitchen by means of a small lift. In the dining room three privates of the Hospital Corps are on duty. About 125 Hospital Corps men are fed here on an average.

U. S. Army General Hospital,
Presidio of San Francisco, Cal.

The following bill of fare is hereby ordered for the Hospital Corps and will be adhered to as far as practicable. Deviations must be reported by the cook to the officer in charge of the kitchens.

BILL OF FARE.

Breakfast.	Dinner.	Supper.
Sunday.		
Fried ham and eggs. French fried potatoes. Bread, butter, coffee.	Roast veal and gravy, with dressing. Mashed potatoes, corn. Cornstarch pudding. Apple sauce. Bread, butter, coffee.	Cold meat, potato salad. Bread, coffee. Apple pie.
Monday.		
Oatmeal and milk. Fried bacon. Fried potatoes. Bread, butter, coffee.	Vegetable soup. Roast beef and gravy. Boiled potatoes. Stewed tomatoes. Bread, coffee.	Beef stew. Stewed prunes. Bread, butter, coffee.
Tuesday.		
Biscuits. Meat and gravy. Butter, coffee.	Vermicelli soup. Roast mutton. Mashed potatoes. Turnips, coffee, bread.	Cold meat. Fried potatoes. Rice pudding. Bread, coffee.
Wednesday.		
Beefsteak. Hot cakes, syrup. Coffee.	Bean soup. Roast beef and gravy. Boiled potatoes, peas. Coffee and bread.	Cold meat. Fried potatoes. Apple pie. Bread, coffee.
Thursday.		
Oatmeal and milk. Meat and gravy. Fried potatoes. Bread, butter, coffee.	Vegetable soup. Baked beans, bacon. Bread, coffee.	Hash, baked. Sago pudding, prunes. Bread, butter, coffee.
Friday.		
Biscuits. Beefsteak and gravy. Potatoes. Butter and coffee.	Vegetable soup. Baked fish. Mashed potatoes. Lima beans. Bread and coffee.	Cold meat. Potato salad. Stewed apples. Bread, coffee.
Saturday.		
Oatmeal and milk. Cold meat and gravy. Bread, butter, coffee.	Vermicelli soup. Roast beef. Macaroni and cheese. Bread and coffee.	Meat and gravy. Fried potatoes. Rice pudding. Bread, coffee.

The hospital fund has no source of revenue at this hospital, except from savings of rations and such small sums as may be gained from the feeding of sick officers who are messed from the kitchen of the Hospital Corps. In this the Hospital Corps detachment on duty at this hospital is under a decided disadvantage as compared with company organizations and post hospitals who enjoy the advantages of such benefits as accrue to hospital and company funds by a well-directed post exchange.

Report on the work done in the Bacteriological Laboratory of the United States Army General Hospital, San Francisco, Cal., by Acting Asst. Surg. Charles F. Craig, Pathologist to the Hospital.

I have the honor to submit a report of the work done in the bacteriological laboratory of this hospital for the period July 1, 1899, to June 30, 1900.

Prior to October 4, 1899, when I took charge of the routine pathological work of the hospital, the following examinations had been made by Acting Assistant Surgeon Ames:

Total number to October 4, 1899, 614, divided as follows:

1. Examinations of blood, 256. Of these examinations 91 gave a positive reaction to the Widal test and 15 proved positive for the malarial parasites. Of the 15 positive malarial cases 11 showed the tertian parasite, 3 the æstivo-autumnal parasite, and 1 the quartan parasite.
2. Examinations of urine, 132.
3. Examinations of sputa, 87. Of these, 16 showed the presence of the tubercle bacillus.
4. Examinations of cultures for Klebs-Lœffler bacillus, 65. Of these, 32 proved positive.
5. Examinations of fæces, 30. Of these, 6 showed the presence of the amœba coli.
6. Miscellaneous examinations, 44.

Of the 91 positive Widal tests a large number were reexaminations.

From October 4, 1899, when I was assigned to duty here, to June 30, 1900, the total number of examinations made has been 5,574. These examinations may be divided as follows:

A. Examinations of blood	2,464
B. Examinations of urine	2,071
C. Examinations of sputa	496
D. Examinations of fæces	313
E. Examinations of cultures	46
F. Examinations of post-mortem material	159
G. Miscellaneous examinations	25
Total	5,574

(A) Examinations of blood. These may be divided as follows:

1. For the parasites of malaria and leucocytosis, 1,891.
2. For the Widal test, 561.
3. For the estimation of the number of blood cells, 12.

1. Of the 1,891 examinations of the blood for the parasites of malarial fever, 264 proved positive and 1,627 negative. This large negative result is due to the fact that the blood of every case admitted to the hospital is examined whether malarial fever is suspected or not. Hardly any of the negative cases were diagnosed as malarial fever, although many had been diagnosed as "malarial cachexia;" but repeated examinations of the blood of most of these cases resulted negatively, and the cases were found to be suffering from chronic dysentery or diarrhea.

Of the 264 positive cases 134 were found to be infected with the tertian malarial parasite (18 being double tertian infections), 100 with the æstivo autumnal parasites, 27 with both tertian and æstivo autumnal parasites, and 3 with quartan parasites.

The tertian infections were mostly contracted in this country and the Philippine Islands, and proved very amenable to treatment. The æstivo autumnal infections were much more resistant to treatment, but I have yet to see one which has not yielded to quinine when properly given, although, of course, exacerbations of the disease often occurred if the quinine was discontinued. In fact, it is very difficult to determine when any case of malarial fever is actually cured, as is evidenced by the recurrence of the disease in so many cases after weeks or even months in uninfected localities. In one case in which tertian parasites were found in the blood, it had been months since the last attack of malaria, and quinine had been taken steadily up to a week before the attack, when it was stopped. After only a week's absence of quinine the disease recurred, thus proving how resistant malarial infections can be to treatment, and that no active symptoms may show for months under quinine, but its withdrawal may be promptly followed by such symptoms.

I have been able to confirm in the æstivo-autumnal cases the occurrence of two varieties of the parasites causing the disease, and will submit a detailed report as soon as possible concerning this subject.

Three cases of quartan-malarial fever have been observed, one of which was of more than usual interest, showing numerous nearly full-grown quartan-malarial parasites in the blood, characterized by the coarse, immotile pigment, clear outline, and the shrunken condition of the infected corpuscles and their olive-green color. This man had been in the hospital since November 19, 1899, and had never had any distinct malarial symptoms or any paroxysm. Despite this, his blood contained full-grown quartan parasites in goodly numbers. The case is of interest, as showing how the blood may contain numerous parasites, although there are no clinical symptoms produced by them. It also shows how important an examination of the blood is, and how little clinical signs can be relied upon in diagnosing certain cases of malarial fever. In time, when the organisms became sufficiently numerous, this case would undoubtedly have developed symptoms, but the microscopical examination of the blood made it possible to apply the proper treatment before the clinical appearance of the disease, and thus saved the patient much discomfort.

Another case is also of interest, both because of the type of the disease and the great resistance of the infection to quinine. The patient entered the hospital November 3, 1899, with the history of a chill every four days. The blood contained numerous hyaline and half-grown quartan parasites. Quinine was given in large doses. His symptoms disappeared, as did the parasite from the blood. After about three weeks the quinine was discontinued and the elixir of iron, quinine, and strychnine substituted. In a few days he developed symptoms, and on December 11, 1899, his blood was examined and numerous half-grown quartan parasites found. Quinine was at once given in 15-grain doses once a day. The patient improved, and it was thought safe to discontinue the quinine on January 4, 1900. Next day the patient had a chill and numerous quartan parasites were found in his blood.

It will be seen from the foregoing that after reducing quinine and finally substituting the elixir of iron, quinine, and strychnine the patient had slight symptoms and the parasites were found in the blood. The symptoms disappeared, and also the parasites when large doses of quinine were again administered, and as long as the patient continued taking 15 grains of quinine a day he remained well. However, on stopping the quinine for only two days, after having taken it nearly a month, he had a severe paroxysm and numerous parasites were found in the blood. I believe that this is the first case of quartan-malarial fever on record which has proven so resistant to quinine, for, as a rule, quartan-malarial fever is very amenable to treatment. The case is of general interest as showing how long the malarial parasite may remain dormant, apparently disappearing, only to reappear when quinine is discontinued, and how important it is to continue the administration of the drug for weeks after all symptoms have ceased. Since January 6 he has had another exacerbation, due to the withdrawal of quinine.

The occurrence of these three cases of quartan fever has given me an excellent opportunity of studying this interesting and rare variety of the malarial parasite. Of over 1,500 cases of malaria, the blood of which I examined and the records of which I have preserved, only 10 cases of quartan fever were observed. The quartan parasite, on account of its rarity, has not been as often and as accurately studied as either the tertian or æstivo-autumnal parasite. Its cycle of development, as is well known, occupies seventy-two hours. The first form of the organism seen in the blood is a small hyaline disk, very minute and actively amœboid. Although these bodies are generally believed to be indistinguishable from similar tertian parasites, I believe that the quartan-hyaline body is more sharply cut and refractive than the tertian, while the invaded corpuscle is of a more greenish hue. In a few hours these small hyaline organisms have grown larger, are less actively amœboid, and a few granules of dark-brown pigment may be seen within them, generally at the border of the organism. The shape of the organism is either round or triangular, the amœboid motion being very sluggish. The pigment is motionless. I have never seen a pigmented organism which was actively amœboid. The organism is sharply outlined and refractive, while the invaded corpuscles are greenish in color and not swollen. Even at this early stage I believe it is possible to distinguish this form from the tertian parasite, which is dim of outline, of irregular bizarre shape, with active pigment, and inhabiting a pale, swollen corpuscle.

In twenty-four hours the distinguishing features of the quartan parasites are fully developed. The organism is sharply cut and looks often as though it were stamped into the blood corpuscle; is refractive, and its protoplasm often presents a peculiar, finely granular appearance; the pigment is dark brown in color, in the form of rather coarse granules, and is generally collected around the edge of the organism, sometimes forming almost a complete wreath around it; the pigment is absolutely motionless. The shape of the organism at this stage of development is usually triangular, ovoid, or round, and is not amœboid. The invaded corpuscle is smaller than the healthy ones, and is of a darker green color. All these characteristics clearly distinguish the quartan form from the tertian parasite, which is less sharply cut and refractile, is more or less amœboid, very irregular in outline, possessing lighter brown, more finely granular pigment, which is always motile, while the infected corpuscle is pale and often greatly swollen.

At the end of thirty-six hours all the phenomena noted are more pronounced, the organism filling about two-thirds of the corpuscle, which seems to be retracting about it. The pigment is increased in amount, but is motionless and collected in rough masses at the border of the organism, which is not amœboid. The growth of the organism from this time on is very slow, and it is not until a few hours before segmentation that the full-grown bodies are observed. Such an organism is circular in shape, bordered by a thin greenish layer representing the remains of the infected corpuscle, with numerous clumps of dark-brown motionless pigment, not only entirely confined to the periphery of the organism, but scattered through it, the protoplasm of the organism being finely granular in appearance. In many instances segmentation was seen to take place even before the corpuscle was entirely destroyed, the pigment collecting toward the center of the organism and six or more segments appearing within the corpuscle. Most commonly, however, the pigment in the full-grown parasites collects at the center in a solid, almost black, mass, and about the same time all trace of the infected corpuscle disappears, the organism being apparently extracellular. In a short time radial striations are observed shooting out from the central pigment, and these joining at their extremities form from six to fourteen oval segments. As a rule, the number of segments does not exceed ten. They are arranged regularly at first around the central pigment, forming the so-called "marguerite forms," but soon they begin to separate and disappear, the pigment at the same time disintegrating and becoming diffused. The number and the beautifully regular arrangement of the segments would alone serve to distinguish this stage of the quartan from the corresponding tertian parasite, but the quartan segments are also more oval in shape, more refractile, and somewhat larger. The star-like arrangement of the pigment between the segments, which Thayer considers as so characteristic, is generally observed, but I have seen exactly the same arrangement of pigment in tertian segment forms. It is probably simply an accidental occurrence, doubtless more common in the quartan parasite, but not at all peculiar to it.

The pigment in the quartan organism is only motile in the very young forms, is always dark brown in color, and occurs in round granules or in irregular masses of such granules. It generally occupies the periphery of the organism and tends to become collected at one portion, but in the full-grown parasites the granules and blocks of pigment are scattered throughout the protoplasm.

The outline of the quartan parasite, especially after the first twenty-four hours, is always very sharply cut, and appears as though stamped into the corpuscle. The shape of the organism is either round, oval, or triangular, and only in the very early hours of its development does it send out amœboid processes of any size. Later the amœboid movement consists of a gentle, sluggish undulation of the periphery of the organism, but even this ceases after the first thirty-six hours.

The protoplasm is refractive and often, on close inspection with a good light and a high power, a peculiar, finely granular appearance is noted, which has been mentioned. This, together with the sharply cut outline and blocks of pigment, brings to mind very forcibly the similar appearance of the ovoid bodies and crescents of the æstivo-autumnal parasites. Indeed, the organism during every stage of its development resembles much more closely the tertian æstivo-autumnal parasite as it occurs in splenic blood than it does the ordinary tertian organism. The corpuscles which are invaded by the quartan parasites are invariably somewhat shrunken and greener in color than the healthy corpuscles, but are not often crenated.

From this résumé of the characteristic features of the quartan parasite, as it has been observed here, it will be seen that it can be easily distinguished from the ordinary tertian type by its cycle of development covering about seventy-two hours; by its smaller size; sharply cut, more regular outline; refractive, finely granular protoplasm; motionless darker brown pigment, collected peripherally; lack of or very sluggish amœboid motion; smaller number of segments, which are more refractive, oval in outline, and more easily distinguished.

During the past four months I have had the opportunity of completing certain observations upon the flagellated forms of the malarial parasites, which, by the courtesy of the Surgeon-General, have been published in the New York Medical Journal for December 23, 1899. A brief review of the conclusions arrived at follows:

From the observations made I believe that there occur in the blood of cases of tertian, and especially in the blood of the æstivo-autumnal fever, two forms, or perhaps varieties, of the flagellated malarial organism.

The following method is most useful in obtaining flagellated bodies: The finger or ear is carefully cleansed with alcohol, as also the slides and cover glasses. Either the finger or lobe of the ear is compressed. A puncture is made with a sterile needle, and the first drop of blood wiped away. The second drop remains exposed until the slide is gently breathed upon, when the tip of the drop is pressed upon the side of the slide which has been thus moistened. The cover glass is then immediately placed over it and the preparation is ready for examination. The slight exposure of air and the small amount of moisture upon the slide seems to hasten exflagellation, since specimens so prepared almost invariably contain flagellated bodies. The two forms of flagellated parasites above referred to are designated as the active and passive flagellated plasmodium. The active form is the most common form found in the blood of tertian malarial fever. It is also found in æstivo-autumnal fever, but in this condition varies somewhat in morphology in unessential particulars. The chief facts to be noted in reference to the active form are the extreme activity of the pigment in the parasite prior to flagellation and during the time the flagella remain attached to it, the clubbed extremity of the flagella and the separation and constant individual existence of the flagella, and their power of individual and progressive movement in the blood. While the passive flagellated plasmodium is more common in æstivo-autumnal fever than in the tertian malaria, not every case shows flagellated organisms. They will only be found in the peripheral blood in those cases of fever showing crescents, for it is from the crescent that they develop. The points to be especially noted in the passive flagellated parasite are that the pigment does not become active and distributed throughout the plasmodium, the circular arrangement of the pigment, the absence of clubbed outer extremity to the flagella and the frequent presence at the juncture with the round body of a nodule which resembles exactly the clubbed outer extremity of the flagella of the active body. Instead of the rapid serpentine lashings of the flagella in the active form the movements in this form apparently consist in a rapid revolving upon their axes, the flagella sometimes pulling themselves loose from the round body and again becoming attached to it. In specimens in which the nodular swelling is not noted the pigment has a more rapid vibratory motion. These forms of malarial parasites represent the efforts of flagella which have been set free in the circulation to penetrate into the interior of the parasite represented by the round bodies just described.

In the light of the researches of McCallum, Thayer, and others, I believe that the passive flagellated bodies represent a phase of fertilization of the parasite probably having to do with its extra corporeal life.

The following observations upon the staining reactions of the parasites of malarial fever are of interest and are the result of experience gained in the examination of a very large number of stained specimens of malarial blood:

The staining reactions of the tertian, quartan, and æstivo-autumnal parasites.—There are many ways of staining the parasites of malarial fever, but a description of a few of the most useful is all that will be attempted at this time. The blood smears are prepared by carefully cleaning the lobe of the ear, puncturing it with a sterile needle or lancet, touching a clean cover glass to the resulting drop of blood, and placing another cover glass over it. The two are then slid very gently and carefully apart, and the smear allowed to dry. Care should be used not to get too much blood upon the first cover glass, and to use no pressure in sliding the glasses apart. After drying the smears are allowed to harden in equal parts of alcohol and ether for half an hour, when they are ready to stain. The plasmodia are stained by nearly all basic aniline dyes, but not by the acid dyes. For staining, I use either Romanowsky's or Chenzinsky's method, the latter preferably. Romanowsky's method is as follows: Two solutions are used—solution No. 1, a saturated aqueous solution of methylene blue; solution No. 2, a 1 per cent watery solution of eosin. The methylene-blue solution should be at least one week old. The staining solution is made fresh each time it is used, and consists of one part of the filtered methylene-blue solution added to two parts of the eosin solution and thoroughly mixed. The smears are placed face down upon this solution and allowed to stain from one-half to three hours or more. The best results are obtained after about two and a half hours' staining. By this method the red corpuscles are stained red by the eosin and the parasites a deep blue by the methylene blue. Romanowsky believed that the nuclear chromatin stained a violet color, but I have never been able to confirm his observations. Although very beautifully stained specimens can be secured by this method, I much prefer the method of Chenzinsky, for the reason that it gives a more natural appearance. By Romanowsky's method, and, in fact, by most methods, the coloring is very vivid, especially that of the red corpuscles by eosin, whereas in Chenzinsky's method the red corpuscles are stained more dimly, appearing almost natural in color, while the parasites are stained a fine blue, fully as well as by any other method.

Chenzinsky's method is as follows: A concentrated watery methylene-blue solution, diluted one-half with water, is added to an equal amount of a one-half per cent solution of eosin in 60 per cent alcohol. This solution is bottled and kept and improved in staining qualities by age. The specimens are stained with this solution for five minutes and then washed in water, dried, and mounted in Canada balsam. Much better specimens are obtained by staining for two hours or more, and I have secured very fine specimens by leaving the smears in the staining solution overnight.

There are numerous other methods of staining the malarial parasites, but these are the most satisfactory and useful.

A word as to the use of stained preparations for diagnostic purposes. I am aware that a few authorities use stained preparations almost entirely for diagnosis, but I believe that it is a cumbersome and very unreliable practice. Where it is impossible to keep a specimen of blood fresh enough to look at under the microscope the use of stained preparations is of course necessary; but where it is possible to examine the blood fresh it is always to be preferred, as it is infinitely more exact and satisfactory. I have seen many cases where the fresh blood showed numerous ring forms of the æstivo-autumnal parasites in which smears taken at the same time and stained most carefully showed either none or at most a very few dimly colored parasites. There is also the danger of mistaking stained granular matter or débris lying upon the corpuscles for the small æstivo-autumnal parasites in the smears, and this mistake can be very easily made by one who is unaccustomed to examining such preparations. The only strictly scientific way of diagnosing the various forms of the malarial parasites is by the microscopical examinations of the fresh blood, and after all most specimens of blood will keep in a suitable condition for examination under ordinary circumstances for six, eight, or even a greater number of hours, despite the text-book statements to the contrary.

The staining method devised by Futcher is to be recommended wherever speed is desirable in staining or where the fresh blood can not be examined and a speedy diagnosis is essential. It is as follows: The smears are hardened in a 1 per cent solution of formalin in 90 per cent alcohol for from a half to one minute. They are then dried and stained for from twenty to thirty seconds in the following solution of thionin, known as Marchande: Saturated solution of thionin in 50 per cent alcohol, 20; 2 per cent solution of carbolic acid, 100. The solution should stand several days before using. After staining the specimen is washed in water, dried, and mounted in Canada balsam. The red corpuscles are stained a very slight greenish hue, while the parasites are deep violet in color. Care should be used not to stain for too long a time, and also not to allow the formalin solution to act long, as it seems to cause a degeneration and vacuolization of the red cells. The method stains the æstivo-autumnal rings very satisfactorily.

The staining reactions of the tertian and quartan malarial parasites.—In properly stained preparations of the tertian and quartan parasites two distinct portions can be made out—a deeply staining ectoplasm and a dimly staining endoplasm. The endoplasm is really the nucleus of the parasite, and sometimes there can be seen, situated eccentrically between the ecto and endo plasm, a very deeply stained spot, the nucleolus, and this contains the greater part of the chromatin substance. These appearances are best observed in half-grown parasites which are not undergoing marked amœboid change of form. The ectoplasm contains the pigment. The nucleus is generally round or oval in shape and eccentric in situation. The very youngest tertian and quartan parasite is represented by a blue ring, the center of which is almost colorless. At some portion of the central colorless area and the blue-stained ring may often be seen a deeply stained dark-blue dot. Here we have the clearly differentiated ectoplasm stained blue, the endoplasm, or nucleus, almost unstained, and the deeply stained nucleolus. As the organisms grow, pigment granules appear in the ectoplasm, or stained portion, and by reason of the change of shape to the amœboid motion the central colorless nucleus is not easily made out, it being often situated in one of the pseudopodia. By reason of the amœboid changes in the shape of the parasites and the situation of the pseudopodia at different levels in the infected corpuscle it often appears as though there were two or more stained parasites within one corpuscle. In the stained ectoplasm both deeply and dimly stained areas can be dis tinguished. These occur without any regularity, and are probably due to different quantities of the stained protoplasmic substance collected at certain places. It will often be noticed that the extremities of the pseudopodia are stained much more deeply than other portions of the parasite. Very seldom is any pigment seen within the clear, almost unstained nucleus. Often, however, young forms are seen which stain almost uniformly throughout, no trace of a nucleus being visible.

As the parasites grow larger and approach full development, the distinction between the ectoplasm and the nucleus is gradually lost and is often represented simply by a more or less irregular, dimly stained area free from pigment. Often even this appearance is absent, and the parasite consists of a pretty uniformly stained pigmented mass of protoplasm. The small, deeply stained spot or nucleus always disappears before the parasite attains its full growth, and is by no means constant even in the young forms.

Just before segmentation, when the pigment has collected in a clump, the stained tertian or quartan parasite presents a peculiar dotted or mottled appearance, due to small, very deeply stained dots or spots scattered through the more deeply stained protoplasm of the parasite. As segmentation advances and the parasite begins to split up it will be seen that these darkly staining dots are in reality the nucleoli of small dimly stained rings or young tertian or quartan parasites, and correspond exactly to the young stained forms first described.

The pigment does not stain appreciably in well-prepared specimens, and the parasites which show the centrally situated clear, very dimly staining area or nucleus are always collected within the stained ectoplasm. This agrees well with the well-observed fact that in the fresh specimen the pigment granules are almost always collected at or near the periphery of the organism in its young pigmented stage.

The staining reactions of the æstivo-autumnal malarial parasites.—The staining reactions are similar, both for the quotidian and tertian æstivo-autumnal parasites.

The "ring forms" of the æstivo-autumnal parasites show a more or less deeply stained outer portion, a round or oval unstained central position, and a very deeply staining minute dot, situated at some point at the periphery of the stained ring. As the parasites grow, the endoplasm stains faintly and the distinction between it and the ectoplasm becomes less marked. The deeply staining dot disappears and just before segmentation the parasite stains a uniform blue throughout. The pigment granules, if present, are collected in the stained outer portion, in the half-grown parasites, and at or near the center just before segmentation. The individual segments stain, as do the intracorpuscular rings, the only difference being that they are smaller.

Staining reactions of the crescents and ovoids.—The crescent form of the æstivo-autumnal parasites presents many interesting staining phenomena. In those crescents in which the pigment is collected near the center the organism as a whole takes a rather dim blue color, the poles staining much more deeply, while the center, in which the pigment lies, is often unstained or but dimly stained. At each pole, as a rule, may be seen a very deeply stained semilunar portion extending to its periphery and covering the horns of the crescents. The appearance presented is that which would result had each horn of the crescent been dipped into a darker staining fluid and withdrawn. Between the dimly stained horns of the crescent and lying within the more dimly stained protoplasm are often seen very deeply stained round or oval spots irregularly distributed. In some crescents these deeply stained spots are very distinct and occupy a large part of the protoplasm of the crescent. As a rule the area in which the pigment lies and immediately surrounding it stains very faintly or not at all, but it is not rare to see a darkly staining belt or band passing through the center of the crescent, seeming to divide it into two parts. This appearance, however, is not common and does not by any means prove the dual nature of the crescent. Surrounding the crescent in the majority of instances is a narrow eosin-stained border, believed to be the remains of the red corpuscle in which the crescent was developed. This red-stained border does not always, however, entirely surround the crescent; sometimes it is only observed between the two horns, forming the so-called "bib;" sometimes it is absent there and present over the convex portion of the crescent; sometimes it can only be seen covering the horns of the crescent. It is often observed to be broken or ragged in outline and interrupted in places, thus suggesting the gradual disintegration of the red cell. Crescents are often observed which do not show any eosin-stained border, and in such cases we may assume that the destruction of the red cell is complete and the crescent is free in the blood plasm.

While the above description applies to the majority of stained crescents, many exceptions occur. Quite often crescents are observed stained uniformly throughout. Others do not present the deeply stained spots or polar staining; others stain very dimly at one pole and deeply at the other. In fact, it would be almost impossible to describe all the variations which may occur, but in the vast majority of examinations of stained crescents the description given will be found correct. There is no evidence in crescents of a nucleus.

The ovoid bodies stain exactly as do the crescents, so far as I have been able to observe, save that the polar staining is not so pronounced.

In studying the blood of soldiers returning from the Philippines and suffering from malarial fever I have noticed in several cases a peculiar form of the malarial parasite and which I have classified in reporting upon the cases as a tertian parasite, but which presents so many differences from the ordinary tertian parasite as to indicate that it is a distinct variety of the plasmodia.

I have invariably observed it in the blood of cases having tertian paroxysms, and always in large numbers. All stages of the parasite have been observed, from the hyaline disk to the segmenting bodies. It appears first as a very highly refractive circular hyaline disk, having a sharply cut outline and having absolutely no amœboid motion. The absence of amœboid motion differentiates it from all other young forms of the malarial parasites, and is, therefore, very distinctive. The hyaline disk is about one-fourth the size of the infected corpuscle, which is normal in size and appearance. I have never observed any "ring forms" of this hyaline stage.

In a few hours the hyaline disk has grown to about one-half the size of the corpuscle which contains it and has become pigmented. The pigment exactly resembles that found in the ordinary tertian parasite, being finely granular and motile and distributed unequally throughout the parasite. The parasite is perfectly circular in shape and devoid of all amœboid motion. The border of the parasite is very sharply defined and the protoplasm very refractive and sometimes finely granular. The infected corpuscle is unaltered in size or color and is not crenated or shrunken.

In about 38 to 40 hours the parasite has nearly filled the corpuscle containing it, and the amount of pigment has increased. The parasite is perfectly circular in shape and presents the same refractive protoplasm and sharply cut border; the pigment is sluggishly motile, reddish in color, and the shape of fine granules. The infected corpuscle is normal in size and color.

I have not as yet observed the presegmenting forms in the blood, but have seen several free segmenting forms. These are much smaller than the ordinary tertian segmenting forms, and the greatest number of segments observed has been ten. The segments are oval in shape or perfectly round, sharply cut and refractive. The pigment is usually collected in a solid reddish brown mass at the centre and is immotile.

From the description given it will be seen that this parasite differs markedly from the other known malarial organisms.

The following table will make this more plain:

FROM THE TERTIAN PARASITE.

Hyaline stage:

1. Always circular in shape, while tertian is irregular and bizarre.
2. Absence of amœboid motion, while tertian is markedly amœboid.
3. Clear-cut and refractive, while tertian is indistinct and not refractive.
4. No change in infected corpuscle, while the tertian-infected corpuscle is often larger and more pale.

Pigmented stage:

1. Always circular in shape, while tertian is irregular.
2. Absence of amœboid motion, while tertian is amœboid in early stage.
3. Clear-cut outline and refractive, granular protoplasm, while tertian outline is less distinct and protoplasm is cloudy.
4. More sluggish motion of pigment.
5. No change in size, shape, or color of infected corpuscle, while in tertian the infected corpuscle is larger than normal and much more pale in color.

Segmenting stage:

1. Smaller number of segments and their more clearly cut outline.

FROM THE ÆSTIVO AUTUMNAL PARASITE.

Hyaline stage:

1. Perfectly circular shape, while the æstivo autumnal parasites are often irregular.
2. Absence of "ring forms."
3. Absence of all amœboid motion.
4. Large size.
5. No change in infected corpuscle.

Pigmented stage:

1. Large size.
2. Greater amount of pigment and greater motillity of it.
3. No "ring forms."
4. Absence of all amœboid motion.
5. No change in infected corpuscles.

Segmenting stage:

1. Greater size of segments.
2. Larger amount of pigment.

FROM THE QUARTAN PARASITE.

The differentiation of this parasite from the quartan organism is much more difficult than is the case with the tertian or æstivo autumnal parasites. Indeed, I first mistook them for quartan parasites until the clinical histories of the cases and certain peculiarities of the parasites caused me to study them more carefully. This organism is about the size of the quartan parasite, has the same clear-cut outline and refractive, finely granular protoplasm, and divides into about the same number of segments, but the following differences are to be noted:

Hyaline stage:

1. Perfectly circular shape; quartan irregular.
2. Absence of amœboid motion; quartan amœboid.

Pigmented stage:

1. Perfectly circular shape; quartan often triangular or ovoid.
2. Absence of amœboid motion; quartan amœboid at beginning of pigmentation.
3. Larger amount of and more finely granular pigment, irregularly distributed and motile; quartan has coarse pigment granules, arranged in a wreath-like manner around the edge of parasite, collected at one portion, and the pigment is absolutely motionless.
4. No change in infected corpuscles; corpuscles infected with the quartan parasite are usually smaller than normal and of a darker brown color.

Cycle development, 48 hours; quartan, 72 hours.

From the foregoing it will be seen that the two great points in which this parasite differs from all other malarial parasites is the retention of its perfectly circular shape through all stages of development and the absolute absence of all amœboid motion. These two phenomena have been present in all the cases in which I have observed the organism, about six in number. I believe that this parasite is either a distinct variety of the malarial plasmodia or that it is a tertian parasite which has acquired the characteristics described through some unknown condition of environment acting upon the development of the organism.

In closing this portion of my report I wish to call attention to the large number of cases of æstivo autumnal fever presenting no symptoms, but in which the blood examinations showed parasites. Fully 40 per cent of the cases showed no active symptoms.

The Widal test.—Five hundred and sixty-one Widal tests were made, of which 96 proved positive and 465 negative. Of the 96 positive reactions, 51 were reexaminations made of cases tested between July 1 and October 4, 1899. In all the cases giving a reaction the clinical symptoms showed them to be typhoid, save in one instance, where the diagnosis was doubtful clinically. In no case in which typhoid fever was diagnosed clinically did the Widal test fail to react.

In point of time the reactions may be divided as follows:

Day of disease.	No. of cases.	Day of disease.	No. of cases.
Fifth day	4	Second week	2
Sixth day	10	Fourth week	35
Seventh day	2	Sixth week	20
Eighth day	2	Six months, convalescent	5
Ninth day	1	One year, convalescent	4
Tenth day	4	Two years, convalescent	2
Eleventh day	2	Seven years, convalescent	1

In the last case the patient gave a clear history of having had typhoid fever seven years ago, and had not been sick until his present illness from chronic dysentery. The case is of interest as showing how long the reaction may persist. It is probable in such cases as this that many of the confusing and varying results of the Widal test have arisen, causing an ill-deserved condemnation of it from men too careless to inquire into the past history of the patient, whose blood has given the contradictory results. The more I use the test the more I become convinced that, if properly used, with perfect technique and proper attention to every detail, it is practically the best and surest diagnostic sign of the disease which we possess at present. In more than one instance in cases when the clinical symptoms of typhoid were entirely absent, and yet a positive Widal was obtained, autopsy showed the presence of typical ulcerations in the intestine, thus proving the correctness of the reaction.

The large negative result is due to the fact that the Widal test has been used largely here as a routine measure, most of the cases being tested regardless of the disease present. There has been no complete tabulated list of these cases kept, but below are listed 360, giving the diagnosis and results of the test. It may be said that on only one of these cases was the result positive, that of a case of miliary tuberculosis. While the patient gave no history of having had typhoid fever, it is possible that he may have had a slight attack while at Chickamauga Park in 1898.

Diagnosis.	No.	Result of test.	
		Positive.	Negative.
Tertian malarial fever	45	....	45
Quartan malarial fever	2	....	2
Æstivo autumnal malarial fever	32	....	32
Comb. æstivo autumnal and tertian	9	....	9
Chronic dysentery	94	....	94
Chronic diarrhea	10	....	10
Chronic tuberculosis	50	....	50
Acute miliary tuberculosis	5	1	4
Acute rheumatism	4	....	4
Chronic rheumatism	30	....	30
Insolation	5	....	5
Progressive pernicious anæmia	11	....	11
Diphtheria	5	....	5
Smallpox	2	....	2
Appendicitis	4	....	4
Wounds of operative cases	20	....	20
Acute pleurisy	4	....	4
Tonsillitis	8	....	8
Abscess of liver	2	....	2
Acute bronchitis	5	....	5
Lobar pneumonia	1	....	1
Acute gastritis	1	....	1
Chronic gastritis	1	....	1
Neurasthenia	1	....	1
Acute coryza	1	....	1
Insanity	8	....	8
Total	360	1	359

Examination of urine.—There have been 2,071 specimens of urine examined, both chemically and microscopically. Of these 282 contained albumen, 102 granular and hyaline casts, 97 pus, 13 blood, and 3 sugar.

In examining the urine of chronic dysentery cases I was impressed by the great increase in indican which they presented, and undertook some observations as to the significance of this increase in indican in this particular disease.

Before giving the results of the indican tests a few words regarding the relation of indican to disease, and the objects aimed at in the tests, may be of interest.

When albumen is undergoing bacterial putrefaction indol is produced, and this is the basis of indican. Within the system it is oxidized to indoxyl-sulphuric acid. This acid, decomposed, yields indigo blue or indican. In health but little indol is produced, as putrefaction is absent, and accordingly indican can not be detected in the urine, or, if present, it is in very minute quantity.

Indican occurs in the urine in a number of disease processes and is not pathognomonic of any one disease. It occurs with albuminoid putrefaction. In tuberculosis, in certain nervous disorders, in malignant diseases of the internal organs, and in wasting diseases indican often occurs in excess in the urine. Fetid pus may be the source of indican, as in abscess of liver and empyema. In these tests, then, it is not intended to show that indican in the urine is of any diagnostic importance as regards chronic diarrhea or dysentery, but to learn, if possible, how often it occurs, what its import is, and whether its amount helps in any way in prognosis, and as to the success or otherwise of any plan of treatment.

The test employed for detecting is as follows: Thirty cubic centimeters of urine is mixed with an equal quantity of hydrochloric acid, 1 to 3 drops of dilute nitric acid added, and then boiled, when the mixture turns a dark color. It is then cooled and about 5 cubic centimeters of chloroform added and shaken. The chloroform sinks to the bottom of the test tube and, if indican is present, is colored blue, violet, or almost black. If the indican is present in slight quantity, the chloroform is of a beautiful blue color; if there is a large increase, the chloroform is a deep reddish-violet color, while if the increase is immense, the indican falls as a fine dark-blue or black powder and when it has settled to the bottom of the tube forms a dense, almost black precipitate.

Now, as to the results of the indican tests in cases diagnosed as chronic dysentery to date:

There have been 63 cases investigated, in 46 of which the indican was increased, while in 17 it was normal.

In the 46 cases in which the indican was found increased 22 showed a slight increase, 12 a large increase, and 12 an immense increase.

The relation of the number of bowel movements a day to the amount of indican present is as follows:

Movements per day.	Number of cases.	Slight increase.	Large increase.
1	10	3	7
2	11	4	[1]7
3	7	4 [1]2	1
4	6	4 [1]1	1
5	7	2 [1]2	3
6	2	2	....
7	1	1	....
8	1	1	....
9	1	1	....
10	0	....	....

[1] Immense increase.

The relation of the negative cases to bowel movements is as follows:

	Cases.
1 movement a day	1
2 movements a day	1
3 movements a day	3
4 movements a day	3
5 movements a day	3
6 movements a day	3
10 movements a day	2
11 movements a day	1

Twelve of the above cases have 4 or more bowel movements a day.

At the first test 7 cases had a large increase in indican, with but 3 bowel movements a day.

One week later the same 7 cases showed no indican, but were having from 5 to 15 bowel movements a day. As regards prognosis, the results obtained would at first appear contradictory, if a small amount of indican is considered as a favorable import, but this only apparent. Von Jaksch says: "In general, therefore, the appearance in the urine of large quantities of indican implies that abundant albuminous putrefaction is progressing actively in some part of the system. In simple constipation a notable indicanuria will very often arise." In dysentery and diarrhea no one can doubt but that there is much intestinal putrefaction. Why, then, in many cases having few bowel movements and thus generally considered to be favorably progressing, is indican found, while in many cases having numerous bowel movements the indican is absent or normal? The reason is obvious. In the latter cases, the intestine, by frequent movements, is kept empty, and putrefaction is accordingly less intense; the indol found is rapidly excreted and indican is not formed. Where the bowel movements are few and the disease is present putrefaction is intense, much indol is formed, has time to combine with the sulphuric acid present, and indican is excreted.

This is certainly a strong argument for the eliminative treatment of dysentery by salines, as sodium sulphate, so highly recommended by the French, as no one will deny that indican in dysentery means intestinal putrefaction, and intestinal putrefaction in the long run in these cases means death.

The indican test so far shows this, as regards prognosis: A case of dysentery having few bowel movements a day and showing no indican in the urine is progressing very favorably. A case of dysentery having many bowel movements a day and showing much indican in the urine is in a dangerous condition.

Cases having few bowel movements and much indican need eliminative treatment.

In cases of dysentery having many bowel movements and no indican the prognosis is doubtful, unless the bowel movements are due to eliminative measures.

Further research in this subject will undoubtedly result in at least confirming these results.

Examinations of sputa.—There have been 496 specimens of sputa stained and examined for the bacillus of tuberculosis, of which 70 showed the presence of the bacillus, while 426 were negative. Most of the negative results were obtained in patients suffering from chronic diarrhea or dysentery. Many cases of this disease simulate tuberculosis very closely in their lung symptoms and physical signs, there being often a cough, much expectoration, night sweats, etc., while percussion is also misleading, as the abnormally thin chest wall and the oftentimes shrunken or emphysematous lung tissue give a resonance strongly resembling the percussion note in cavity formation in the tuberculosis lung.

There have been many cases of chronic dysentery in which the attending surgeons have suspected and even diagnosed pulmonary tuberculosis, but in which no bacilli were found after repeated examinations of the sputa. Autopsy in several of these cases demonstrated the value of sputum examinations over physical signs, for in none of these cases was there any trace of pulmonary tuberculosis, although hypostatic pneumonia, pleurisy, and emphysema were commonly found and evidently caused some of the physical signs.

The sputa of all patients having a cough was examined for the tubercle bacillus, whether or no lung signs were present, which also helped in obtaining the large negative result. In the examinations for the tubercle bacillus here, as well as elsewhere, I have noticed especially the great variation in morphology which this bacillus presents in different specimens of sputa. These variations are interesting from both a botanical and diagnostic point of view. From the description of the germ in the majority of text-books upon bacteriology we are prepared to see almost invariably a slender rod, about two-thirds the diameter of a red-blood corpuscle in length, straight or slightly curved, and sometimes presenting a beaded appearance. As a matter of fact, though the form just described is altogether the most common, we do find in a very large number of cases many deviations from the classical type, some of them being peculiar and interesting. The beaded bacilli are present in small numbers in almost every specimen of sputa examined, but quite often specimens are found which contain almost nothing but the beaded form of the organism. As the unstained portions of the bacillus are held by some authorities to be spores, it is of interest to inquire into the meaning of this form. It has been the author's experience that the beaded form of the bacillus is found most often and numerously in the sputa of acute, rapidly advancing cases of tuberculosis. As spore formation in a germ is not evidence of rapid multiplication, but only occurs where multiplication by fission is hindered by unfavorable conditions, the spore being a resistant form of the organism calculated to withstand such conditions, we would expect to find spore-bearing bacilli more numerous in chronic or slowly advancing cases of the disease rather than in acute cases, where the conditions must be more favorable for the growth of the organism. It would seem, then, that the form of the bacillus in question can hardly be called a sporulating body if the theory just quoted is correct, but in the present state of our knowledge and reasoning from the well-known appearance of other spore-bearing bacilli when stained it is hard to explain them in any other way. The beaded bacilli are often numerous, sometimes there not being a solid bacillus to be seen in certain microscopic fields, and they resemble very much short strings of minute streptococci. In general, if the bacilli are curved at all it is but slightly, but in rare instances the curvature may be very extreme. In several instances a bacillus was observed almost doubled upon itself, forming a U-shaped organism. This form is, however, very rare, it being much more common to find the organism less acutely bent. These curved forms are almost always stained uniformly throughout, but occasionally they are irregularly stained. They should be carefully examined, as quite often a similar appearance is produced by the joining of two bacilli, but this is more V-shaped.

A form of much interest, because of the liability of its being taken for another organism, is that to which may be given the name of "streptococcic form." Ordinarily the beaded form of the bacillus, if examined carefully, will be seen to be continuous in outline, the clear spaces being bounded laterally by a dimly stained membrane. In this form, however, no such continuation of the bacillus can be found, the deeply stained portions being circular in form and separated one from the other. These deeply stained portions may be two in number when the organism resembles a diplococcus, or they may be strung out in long or short chains, when it is almost impossible to distinguish them from streptococci. It is just here that the method of decolorizing becomes important, for many times I have been in great doubt respecting this form of the organism until, after repeated and careful use of the acid solution, it became evident that it was the tubercle bacillus, and not the streptococcus, which was present. As streptococci are very numerous in tubercular sputa in many instances, and as this form of the tubercle bacillus so much resembles them, too much care can not be taken in staining and decolorizing. In some instances a portion of the bacillus stains solidly and the remainder is broken up into deeply stained dots.

It sometimes happens, in examining sputa for this organism, that forms are detected which are very thick and deeply stained. This appearance may be caused by the coalescence of two or more bacilli laterally, or it may be a form of a single organism. Certainly it has been impossible to detect any separation longitudinally, and I do not remember to have ever seen an appearance which would suggest that this form is composed of more than one organism.

The looped form of the bacillus occurs rarely. The organism is longer than usual, and twisted upon itself so as to form a loop, but more commonly the loop is situated at one end, the rest of the bacillus being straight or slightly curved.

The long "filamentous form" is of rare occurrence, but it is of great interest. It is not an uncommon form in old cultures and has been often described, but in sputum it is much less common. The filaments are almost invariably stained uniformly throughout, the only thing peculiar about them being their curved outline and their great length. Their resemblance to the tubercle bacillus as ordinarily described is, as can be seen, very slight, but as they are very rare and always accompanied by large numbers of the classical bacilli the diagnosis of tuberculosis will not be endangered.

The remarkable feature about the "knobbed form" is that at some portions of the bacillus, generally on its lateral surface, there is a well-developed knob or lump. This lump may, however, be situated in the center of the organism.

Having within the past three months come across two cases the sputa of which showed numerous examples of the branching form of the bacillus, a description of this rare form may be of interest. I have observed it once before in tubercular sputa and quite often in old attenuated cultures of the germ. Nocard and Roux were the first to call attention to branching and budding forms in avian tuberculosis. Klein, Dixon, and Mafucci noticed the branched form in old cultures, and Fischel called attention to the analogies between those organisms and the ray fungus of actinomycosis. Coppen Jones has contributed valuable information regarding these forms, and Burns, Marpmann, Bahr, Friedrich, and Semmer have confirmed the occurrence of such forms. These forms have been observed most frequently in old cultures, but Fischel and Coppen Jones have observed them in the sputa.

In preparations from the sputa, in two cases examined here, several bacilli presented true branching and also what I believe to be intermediate stages between the simple and the branched rod. While the typically straight or slightly curved rods were much the more numerous, yet every preparation showed some of the branching forms. In neither of these cases, however, were the intermediate and large branched forms so numerous or so typical as in a case previously reported by me in the Journal of Experimental Medicine, Vol. 111, No. 3, 1898.

Very common in many specimens of sputa were bacilli which resembled the branching forms and which may be called "false branching forms." On casual examination the resemblance which these bacilli (for they are multiple) bear to the true branching form is striking and it needs very careful focusing and good illumination, in many instances, to distinguish the difference. This appearance is due, not to a single bacillus sending off branches, but to two or more bacilli lying closely together and in such a position as to give the impression of true branching. Careful examination will, however, in almost every instance disclose a slight, unstained interval at the point where the suspected branching takes place. Such a minute examination should be made of every bacillus which appears to branch. Where no unstained interval can be detected by reason of one of the bacilli overlapping another, careful focusing will show a difference in the level of the bacilli where they overlap, and also a deeper staining at this point, whereas in the true branching form no such difference in level or staining can be detected. Another distinction exists in the fact that in the false branching type the bacilli forming the supposed branches are of the same length as the parent germ, whereas in the branching form the branches may be much longer or shorter than are the bacilli from which they spring.

Of the true branching bacilli several forms may be observed which are doubtless simply stages in the growth of the organism. In certain fields there are some bacilli which show at one or more points small knob-like projections, which cause a marked bulging in the outline of the organism. They need sharp focusing and a good light to be distinguished, as in some of them the bulging is very slight and only careful examinations will demonstrate it. The bulging or knob is generally situated laterally, but may be central. The bud, as it may be called, stains like the rest of the bacillus, and sometimes a very small, oval, unstained speck may be seen within it which resembles the unstained sections of the bacillus. Generally, however, no such appearance is present, the bud staining uniformly throughout. Is this unstained oval speck a spore? I believe not, any more than are the similar unstained spots which occur in tubercle bacilli in general and which are not regarded by the best observers as spores.

The budding form just described is of interest, as it is doubtless the first stage of branching, and I believe it to be present more often than is generally known. I have examined a large number of specimens of phthisical sputa since I first observed this form and have found it present in about 15 per cent of the cases, although in none was the branched form present. This result may appear contradictory if we assume that the budding is the first stage of the branching form, but it is probable that some unknown factor has hindered the further development of the process of branching.

From the budding forms to the fully developed branching forms is merely a stage of growth, evidenced by finding now and then a bacillus with very short branches, evidently outgrowths from the small elevations. The fully developed forms are bacilli, presenting one or more branches developing from the parent bacillus. There are many variations in the manner of growth. Occasionally bacilli are seen where the primary branches have given off one or more secondary branches.

Fantastic figures are often formed by the bacilli, caused by their curved form and the twisting of the branches which are given off. Nearly all the bacilli show well-marked stained and unstained areas, but it is noticeable that the branches present fewer of these, although some show unstained areas, irregular in outline. The bacilli are always larger than usual and often filaments are seen which are very long. The bacillus destined to branch becomes longer than usual and presents one or more knob-like outgrowths somewhere along its course. These outgrowths gradually lengthen and at last become true branches, which may in turn give off other branches.

We are not informed as to the special conditions which determine the development of branching forms of the tubercle bacillus. They have been most frequently observed under unfavorable conditions of environment, as in old cultures. Still, the recent observations of Babes and Levaditi and of Friedrich show that similar forms occur in fresh miliary tubercles. Various theories have been advanced as to the significance of the branching, filamentous, and club-shaped forms of the tubercle bacillus. Some have considered these to be simply degenerative or pathological forms of the bacillus, and without significance as to the classification of the organism. This is the view advocated by A. Fischer, who places these forms of the tubercle bacillus, as well as similar ones of the diphtheria bacillus, in the group of involution forms. There are several objections to this view, of which it will suffice to mention that the forms in question are not limited in their occurrence to old cultures and unfavorable conditions of environment. The opinion more generally advocated is that the occurrence of these forms necessitates some change of formerly accepted views as to the classification of the micro-organisms concerned. Thus, Klein suggests that the branching is a reversion to an ancestral type which presents mycelial growth. Fischer points out the analogies between actinomyces and the tubercle bacillus and Coppen Jones holds that both belong to the same group of organisms, but he leaves undecided whether this is among the hyphomycetes or some other class. He suggests the name tuberculomyces (hominis, avium, etc.) for the bacillus. Burns regards the branching shapes as involution forms when observed under parasitic conditions. He says "they pertain to the saprophyte growth form of a higher organism, which as a parasite in the animal body appears in the form of rods." Marpmann accepts the interpretation of Burns, employs the designation "mycobacterium tuberculosis," a name adopted by Lehymann and Newmann in their Grundriss der Bakteriologie.

The sharper differentiation within recent years of the streptothriceæ, cladothriceæ, and allied organisms has led several writers to express the opinion that the tubercle bacillus and diphtheria bacillus are very closely allied to the streptothriceæ, and some hold that they should be transferred to this group. Kruse, in the last edition of Flugge's Mikro Organismen, discusses this question, and although he does not venture to place the bacteria in question under the streptothriceæ he considers them to be very closely related to actinomyces and other organisms belonging to this group. Johan-Olsen places the tubercle bacillus under the streptothriceæ, and accepts the name "tuberculomyces." The streptothrix group is characterized especially by branching filamentous forms of organisms, and is placed between the bacteria proper and the hyphomycetes, being more closely akin to the former than to the latter.

It is evident that further investigations are needed in order to enable us to come to any definite conclusions as to the significance of the branched forms considered, and for the present it would seem premature to adopt any radical change in the accepted classification of the tubercle bacillus.

Examination of fæces.—There have been 313 examinations made of the fæces, of which only 8 showed the presence of the amœba coli. This result has been surprising to me, as I had expected to find a large portion of the cases of dysentery returning from the Philippines to be amœbic in nature. That such is not the case, however, is evident by the exceedingly small number in which amœbæ were found and by the findings at autopsy. The greater part of the dysentery afflicting our troops in these islands is due to a different cause; the pathological lesions produced are dissimilar to those of amœbic dysentery, as are also the clinical histories of the cases. In a special report upon the pathology of dysentery, which will be submitted to you very soon, I have considered the character and microscopical findings of the diseased intestines and my observations upon a bacillus separated from the tissues in certain cases, and which is evidently identical with that separated by Flexner in cases studied at Manila and by Shiga in Japan. While it is hardly justifiable to claim that this organism is the cause of the disease, at the present time it is very probable that it is.

In the fæces of 4 cases large numbers of the cercomonas intestinalis were found. These little parasites belong to the protozoa, and were first found by Zambl. They are pear-shaped organisms, possessing a nucleus and from 2 to 8 slender, hair-like flagella, which propel the parasites through the material containing them. They move about very actively, often turning completely about and then rushing ahead by a series of peculiar jerky movements. They were present in these cases in large numbers and undoubtedly aggravated the intestinal condition. They have been observed by Davaine in cholera dejections, by Marchand in typhoid, and by Zunker in 9 cases of diarrhea. They apparently thrive in a diseased intestine and probably cause diarrhea and perhaps ulceration. This view is supported by Zunker, Grassi, and Marchand. I have seen these organisms in the fæces of several cases of diarrhea before, but never in such numbers as in these cases, nor have I ever observed them in the fæces of a healthy person.

Tænia segments or ova were not observed in any of the cases, nor were distoma nor ascarides. The anchylostoma duodenale and their ova especially were looked for, but no evidence of their presence was discovered, the ova not being found in the fæces nor the worm in the intestines at the autopsy. The nematode worm, rhabdonema intestinale or anguillula stercoralis, was found in the fæces of one patient suffering from chronic dysentery. The clinical history of the case and the description of the parasite is as follows:

Clinical history: Private J. B., Battery D, Sixth Artillery, age 20. Father died of typhoid fever; mother died of pulmonary tuberculosis at the age of 45; one sister died in infancy; has one brother living. Patient had chills and fever about six years ago. He was taken with diarrhea in Raleigh, N. C., in May, 1898. The attack lasted three weeks. Went to Cuba in December, 1898, and had a second attack while there in February, 1899. The diarrhea has persisted since that time, save during May of this year, when he was some better. Went to Manila in July, 1899, and did duty, despite 10 to 12 movements a day, until October 20, 1899, when he was sent to the hospital. At times his stools have contained blood and he has suffered from tenesmus. He was admitted to this hospital December 19, 1899. Examination showed marked anæmia and emaciation (weight 105 pounds), general tenderness over abdomen, slightly enlarged and tender liver, spleen normal in size, heart and lungs normal. The tenderness in the abdomen is most marked around the umbilicus, and he gives a history of having severe cramp-like pains in this region three weeks ago, but none of any severity since. On December 28, 1899, since taking thymol, his appetite has increased. His bowels move now 7 to 8 times a day and he has gained about 7 pounds in weight.

Microscopical examination.—A specimen of fæces was sent to the laboratory on December 20 to be examined for the Amœba dysenteriæ. The fecal matter was semiformed, bright greenish in color, and contained no blood or mucus. Careful search was made for the amœbæ but none were found. In one preparation, however, two specimens of the nematode worm, the *Rhabdonema intestinale* or *Anguillula stercoralis* was found. These worms measure about 2 mm. long by 0.44 mm. broad, with pointed tails and mouths furnished with three lips; they move sluggishly about.

and their structure could be easily made out. This worm was discovered by Normand, a French army surgeon, who found them in the excrements of French soldiers suffering from the so-called Cochin China diarrhea.

The history of the worm is briefly as follows: The mature worm lives in the intes- inal mucous membrane of the duodenum and upper portion of the jejunum. Of the dult form only the female has been discovered. The female is easily distinguished y five or six elliptical eggs lying attached to one another about the center of the ody near the vulva. The ova develop rapidly, and before the fæces leave the intes- ine the egg breaks and the minute embryos, measuring 0.2 to 0.3 mm. in length, are et free in the fæces. The ova are rarely found in the stools, and it is still more rare o find the adult worms. When the ova are found in the stools they occur in strings f three or more. Manson thus described the embryos after they leave the human ody: "First, unless they gain access to nonputrefying fluid, they die; the fæces ontaining them, therefore, must mix freely with water. Second, if the temperature e low the embryo rhabdonema develops into a filariform larva, which, when swal- owed by man, quickly assumes the parasite form. Third, if the temperature be high, he embryos develop into male and female rhabditic worms, and on being transferred o man become *R. intestinale.* These free mature rhabditic forms are what was ormerly known as *Anguillula stercoralis.* They were found in fæces at post-mortem xaminations and in the fæces after discharge."

The remarkable facts in this case are, first, that the worms occurring in the fæces re adult worms, and, second, no embryonic forms were found. No adult worms have een found in the fæces since the first examination. As to the pathological signifi- ance of their presence in the intestine, there is divided opinion. They were at first upposed by Normand and others to be the cause of Cochin China diarrhea. At the resent time this theory has been abandoned, but the fact remains that they are only resent in cases of chronic diarrhea, never being found in a healthy intestine, and are resent in immense numbers, being found post-mortem, coiled up within or upon the ntestinal follicles, the mucous membrane of the intestine being thickened, inflamed, nd somewhat necrotic. It is impossible to believe that hundreds of these parasites ould be present in the intestinal membrane without causing some pathological lesions, nd it is not improbable that they at least aggravate intestinal disease, if they do not ctually cause it. As to treatment, little can be said. The ordinary anthelmintics re wholly ineffective, and the only drug which has proved at all successful is thymol ontinued for a long time. In the case under consideration the administration of hymol has been followed by marked improvement.

Besides Cochin China, the *Rhabdonema intestinale* has been found in the West ndies, Brazil, Ceylon, Egypt, Bombay, Italy, and Germany. From the history it is mpossible to say where infection took place in this case, but probably either in Cuba r in the Philippine Islands. At the writing of this report, two months after admis- ion, the patient had not improved perceptibly, his diarrhea still continues, but no nore adult worms have been found in the fæces.

Because of their diagnostic importance and the fact that they are often mistaken r other structures occurring in the intestinal tract, a brief description of the amœbæ f dysentery as observed here may be of interest. It is safe to say that among the arasites causing disease in man there is none which has been more often blamed njustly for disease conditions than has the amœba coli. This is because it has so often een said to be present in the fæces when in reality it was not; other things slightly esembling it have been mistaken for it. Large intestinal epithelial cells, leucocytes, ollections of anæmic blood corpuscles, monads, and the *cercomonas intestinalis* have ll been gravely shown to me as the veritable amœba, and that by men otherwise vell informed in such matters. To know the amœba one has to have seen it, and it s one of the most difficult of parasites to recognize from the common text-book escription of it.

As is well known, Losch, in 1875, was the first to describe this organism, and numerous observers have since confirmed his researches. Among these may be men- ioned Kartulis, Kruse, Koch, Manson, Councilman, Lafleur, Dock, and Leuckart. he organism belongs to the Protozoa, class Rhizopoda. It is simply a mass of pro- oplasm provided with a more or less distinct nucleus; hence the liability to mistake t for other similar unicellular organisms or even large cells. When at rest the rganisms may be circular or oval in shape, if arrested while in motion may be rregular. It is more refractive than other cells occurring in the fæces, with the xception of the monads, and the protoplasm has a peculiar faintly greenish hue, lmost like that of certain malarial crescents. Its size varies greatly, from 5μ to 35μ n diameter, but most of the amœbæ seen ordinarily measure from 15μ to 25μ in diameter. While many authorities claim that the amœbæ seen in any one case are ll about the same size, this has not been my experience, and in the cases cited above the amœbæ differed widely, some being very large, others small. The shape, also, varies much, some being perfectly circular, others oval, and others irregular in shape. As ordinarily described, the organism is said to consist of two parts, an inner, granular portion, called the endoplasm, and an outer portion, called the ectoplasm. This description has been the cause for mistaking the organism for large cells, the inner portion corresponding to the granular nucleus and the outer portion to the protoplasm. As a matter of fact, this differentiation can not be made out in all cases by any means, and very seldom in an amœba, which is not motile. While doubtless the two portions mentioned exist, yet too much stress is laid upon them, resulting in confusion, as only the experienced observer can in most instances distinguish them. The organism possesses a nucleus, but this is often difficult to make out, especially in moving amœbæ. It is situated somewhat to one side and is very refractive; its outline is often more or less irregular. The endoplasm forms most of the substance of the organism, is of a peculiar faint greenish hue, very finely granular, resembling finely ground glass, and generally shows a number of perfectly circular or oval so-called vacuoles. The vacuoles are spaces within the protoplasm of the organism, clear cut in outline, and collected together in groups. Many of them seem to contain two or four very refractive dots resembling micrococci. Although these spaces are generally called vacuoles, it is by no means certain that they are so. Certainly they do not resemble the vacuoles in blood corpuscles, and it always appears as though they do not penetrate entirely through the organism, their floor seeming to be formed by a thin veil-like layer of protoplasm. It is impossible to believe that these peculiar spaces are vacuoles, and it is by no means settled that they are so. These spaces vary slightly in size and in number in different amœbæ. The small amœbæ seldom show any, but the large ones seem often to consist of a collection of them surrounded by a small amount of the protoplasm. It would seem from this that such an amœba might be a sporulating body, as the oval spaces resemble very strongly the segments of the sporulating malarial plasmodia. The amœbæ generally show more or less material within their protoplasm, which they have absorbed. They often contain red blood corpuscles, bacteria, pigment particles, etc. Often these inclusions are so numerous that the structure of the amœba is entirely hidden. When it can be seen the ectoplasm consists of a narrow rim of a clear, light-green color surrounding the darker endoplasm.

Now, as to the mobility of the amœba. It is always motionless in fæces which have not been kept warm, as a temperature below 75° F. renders it immotile, but it is often possible, after preparing a specimen upon a slide from such fæces, to render the organism motile by gently warming the slide over an alcohol lamp. The motility of the organism varies, but it is generally a slow amœboid motion, it throwing out rounded protoplasmic processes, exactly as does the leucocyte. These processes are always perfectly clear and formed by the ectoplasm, and these are often the only portions of the organism which show the differentiation into ectoplasm. In rare instances the movement is rather rapid, the processes being thrown out quickly and the whole organism moving in an eccentric, jerky manner. More often, however, the change in position is very gradual, and only careful watching will detect it. Often, also, the organism does not change its position, but merely its shape, the protoplasmic processes being projected and retracted, sometimes so very slowly that only close scrutiny will detect it. Often, also, a peculiar undulatory motion of the border of the organism is noted, exactly like that occurring in the malarial parasites.

When the temperature is that of the body the amœbæ are most active and progress by an almost imperceptible projection, and flowing into such projection of the mass of the organism. When, however, the temperature is low it can be seen that the protoplasmic projection gradually becomes larger, until at last the granular endoplasm flows into it. This process is repeated, and thus the organism alters its position.

The color and the refraction of the amœba should serve to distinguish it from cellular material, as intestinal epithelium, it being of a peculiar faint-green color and very refractive, which is marked enough so that even with a two-thirds objective it can be picked out from the surrounding cellular matter. These properties, however, do not seem to distinguish it from the monas and cercomonas, which are also greenish in color and refractive, but they are much smaller than the large amœba and much more actively motile, not throwing out protoplasmic processes, but moving by means of flagella. To one who has seen the amœba these organisms could never be mistaken for it, but mistakes have been made often when the observer had only the text-book description to guide him. To sum up, then, the amœba is a round, oval, or irregular protoplasmic body, varying in size; motile or immotile, the motility amœboid in character when present being generally moderate; pale or faint green in color; refractive, with a sharply cut border, and containing circular or oval lighter colored spaces, known as vacuoles. In some a darker colored nucleus can be distinguished, and in the immotile organisms a darker colored central or eccentric portion, containing the vacuoles and comprising the greater part of the parasite, and known as the endoplasm, can be seen surrounded by a narrow or much smaller layer, lighter in color and clear, known as the ectoplasm.

Nothing is known as to the method of reproduction of the parasite, but it is generally believed to be by sporulation. If this is so, it is probable that the so-called vacuoles are in reality spores, the mother parasite eventually rupturing, and thus setting them free. Reasoning from what occurs in other similar organisms, this is the most probable method of reproduction. It is impossible, in observing a large circular amœba, filled with the oval or round spaces so that only a thin strip of protoplasm remains visible, to resist the impression of its resemblance to the large segmenting tertian plasmodia, just before the segments separate and become free. Another interesting analogy between the two parasites is that in both a solution of sulphate of quinine arrests all motion immediately and destroys them.

It is not a very difficult matter, where the amœbæ are numerous in the fæces, to obtain good stained specimens if sufficient care be taken in their preparation. While undoubtedly the amœbæ show to greater advantage when stained in sections of tissue, yet the method of staining them in fæces is most practicable and useful, and if the smears are made sufficiently thin the organisms will show very perfectly. So little is said in the recent text-books regarding the appearances presented by the stained amœbæ that a somewhat detailed account of their staining reactions is of interest. Like all protozoan organisms, the nucleus stains with more or less difficulty, but I have found that carbolic fuchsin stains it, as well as the nucleolus, very easily and deeply, while methylene blue stains it dimly and often not at all.

I have tried a large number of different staining solutions, but have found that only three are really worthy of use, in that they are sure, rapid, and show the minute structure of the amœba well. These are: Loeffler's methylene blue solution, carbolic fuchsin solution, and thionin solution. Of these solutions Loeffler's methylene blue is the quickest and best stain for general use, while the carbolic fuchsin solution is by far the best where it is desired to stain the nucleus and nucleolus, as well as certain peculiar bodies within the protoplasm of the amœba. The thionin differentiation method recommended by Mallory, which often gives beautiful results in staining amœbæ in tissue, gives but fair results in the staining of the organisms in fæces, and can hardly be said to be differential, as other structures in the fæces take and hold the stain. It is a useful stain, but methylene blue is far better and much more easily applied.

Having found a specimen of fæces containing numerous amœbæ, the smears are prepared as follows: Several cover glasses are thoroughly cleaned and placed in a row upon the table. With a sterilized platinum loop a small flake of mucus is picked out of the fæces and placed upon a cover glass. This is repeated, a minute flake of mucus being placed upon every other cover glass. The intervening clean cover glass is then dropped gently down upon the glass containing the mucus, and then the two are slid apart, very gentle pressure being used in doing so. By proceeding in this way a dozen or more very even smears can be secured in a few minutes time. The smears are then placed face up in equal parts of alcohol and ether and allowed to harden for thirty minutes. If the fæces are warm when the preparations are made, many of the amœba will be hardened while undergoing amœboid motion. After hardening the smears are ready to be stained.

Loeffler's alkaline methylene blue solution.—The smears are stained in solution for from three to eight or ten minutes; about five minutes gives the best results. They are then washed in distilled water and mounted in Canada balsam. The amœbæ take the blue stain very well, staining almost as deeply as the nuclei of the epithelial cells. In such stained preparations three stages of the amœbæ can be detected. The small amœbæ, staining comparatively uniformly; larger ones, staining less uniformly and containing one or more vacuoles, and still larger ones, riddled with vacuoles, staining very deeply. The smaller or young amœbæ stain much more intensely than the larger ones, and with the methylene blue seldom show a nucleus. No vacuoles can be seen, nor do they often contain red blood cells. The protoplasm is of a rather dark-blue ground color, with small oval or round lighter blue areas, but stain almost uniformly throughout. No distinctions can be traced between the ecto and endoplasm. These small amœbæ are generally round, but sometimes show small pseudopodia, which generally stain very intensely. Some of the small amœbæ show a peculiar mottled appearance, light and dark stained areas alternating throughout their protoplasm. These small forms are evidently young amœbæ. In all the preparations the most numerous forms of the amœbæ are those now to be described. They are large, generally round or oval in shape, although if the preparations are made when the amœbæ are active many of them are irregular in shape and showing pseudopodia. The protoplasm of these amœbæ stains irregularly, but there can be no distinct differentiation into ecto and endoplasm made. One portion of the amœba stains very densely, and there is a gradual shading off into a lighter blue color. In the irregular forms this is most noticeable, the pseudopodia staining very dimly, due to the fact that they are composed of ectoplasm, which takes the stain lightly. Some of the pseudopodia, however, stain very intensely, due, probably, to the fact that the endoplasm had flowed into them just before hardening. These fully grown amœbæ show from one to three or more large vacuoles, which are entirely unstained, but besides these there are numerous small oval or round, very dimly stained areas scattered throughout the protoplasm, which are evidently not vacuoles, and correspond to the same areas observed in the very young forms. Scattered between the oval, dimly stained areas are very deeply stained small portions of protoplasm. The staining phenomena of these amœbæ exactly resemble those of the large segmenting tertian malarial plasmodia. The vacuoles and the dimly stained areas are entirely distinct, the dimly stained areas being oval or round, much smaller than the vacuoles, having a dim outline, and evidently not penetrating the organism, as do the vacuoles. Many of these amœbæ contain red blood cells which do not stain, but show as round or irregular light areas scattered through the protoplasm of the parasite. In a few of the amœbæ very deeply stained, almost black, oval-shaped structures can be seen, generally arranged near the periphery of the organism and resembling bacilli, save that they are too large and are often irregular in shape. In preparations stained for some time some of the large amœbæ show a very deeply stained, almost black nucleus. Surrounding this nucleus is sometimes seen a more lightly stained area with a deeply stained, almost black border. Besides blood corpuscles, the protoplasm of these amœbæ contains numerous more deeply stained, almost black granules and rods and dots which are evidently bacteria of various kinds. Besides the two forms of amœbæ described, large round forms are seen, containing numerous vacuoles and staining more or less dimly. No nucleus can be demonstrated in these forms, nor can the small oval unstained areas be seen. In most instances these amœbæ are simply riddled with vacuoles, the amœba consisting of a stained shell perforated by vacuoles. Many of these show evidences of fragmentation. These are probably degenerate amœbæ undergoing, just as does the plasmodium of malaria, vacuolization and fragmentation. It is a significant fact that such amœbæ never show any inclusions in the way of blood corpuscles or bacteria.

Smears are stained with carbol fuchsin for from five to ten minutes, washed in water, and mounted in Canada balsam. This stain is especially useful in demonstrating the nucleus, which stains very beautifully. The same structures are seen in amœbæ stained by this method as by methylene blue, but, in addition, the nucleus, nucleolus, and certain other details can be made out. The nucleus stains a deep red, is usually situated eccentrically near the edge of the parasite, probably at the juncture of the ecto and endoplasm, but it may be more central. It contains a small, more deeply stained nucleolus and a few almost black granules, while the nuclear substance contains minute, more deeply stained areas. The nucleus is oval in shape and regular in outline. As noted before, the large amœbæ, containing great numbers of vacuoles, do not show any nucleus. .

Besides the nucleus and its contents the fuchsin stain demonstrates within the protoplasm of many of the amœbæ some very peculiar bodies, the nature of which it is impossible to conjecture. Scattered irregularly through the protoplasm are variously shaped particles stained a deep, brownish red, and especially numerous near the nucleus. These particles are oblong in shape, as a rule flat, and much larger than any bacterium. They present often a fractured extremity, as though they were crystalline in structure, and it may be that they are certain crystals absorbed from the fæces.

In all preparations from the fæces, however stained, amœbæ are seen evidently undergoing fragmentation. Numerous knob-like outgrowths are seen almost entirely separated from the parasite, and some which are separated. These fragments stain deeply, and the fragmenting parasite usually shows a normal appearing nucleus, thus showing that the process is a degenerative and not a reproductive one.

Little need be said of the thionin stain. It gives similar results to those just described, and is not nearly as satisfactory as the methylene blue or carbolic fuchsin.

This much can be said to have been demonstrated by the study of stained specimens of the amœbæ:

1. That vacuolization is a degenerative process, as the young amœbæ show no vacuoles, the full-grown, healthy ones few, while the amœbæ in which they are

most numerous are degenerate bodies, showing neither a nucleus nor inclusions of any kind.

2. That there occur in all but the degenerate forms of amœbæ small round or oval unstained areas, uniform in appearance, and most numerous in the large, full-grown forms, and entirely absent in the vacuolated shells of amœbæ. These areas resemble the same areas observed in stained segmenting malarial plasmodia which are in them, due to the young spores, which take the stain but faintly. Reasoning from analogy, it may be seen that these areas in the amœbæ are also spores.

3. That in the protoplasm of the amœbæ there occur peculiar structures, evidently not bacterial in nature, the significance of which it is impossible to decide. It may be that they are certain crystals which occur in the fæces and which have been absorbed by the amœbæ.

I have continued experimental work upon the bacillus which I separated from 3 cases of dysentery in cultures from the intestinal ulcerations and spleen, with especial reference to the agglutination reaction of the bacillus with the blood of cases of dysentery. Of 10 cases of dysentery which were in serious condition in that they were all bed cases and having numerous bowel movements, 9 gave a marked agglutination reaction in a dilution of 1 to 30 within ten minutes, and the 1 remaining gave a slight reaction in the same dilution in fifteen minutes. Of 10 cases of convalescent dysentery, 6 gave a reaction within fifteen minutes. Thus of 20 cases diagnosed as dysentery 16 gave a reaction with the dilution of 1 to 30 within fifteen minutes. These results were very interesting, and undoubtedly show an etiological relation between this bacillus and dysentery.

I have also been able to compare my bacillus with a culture of the bacillus which Professor Flexner separated from dysentery cases in Manila, and which he has kindly sent me, and find that the bacillus which I have separated from cases here is identical with his, and, furthermore, that in all the above agglutination tests bacilli from both his and my cultures gave the same results.

I will report further upon this subject, especially as to the results of inoculation of guinea pigs with the bacilli in question.

Examination of cultures.—Cultures have been inoculated and examined from 46 cases of suspected diphtheria, of which 13 proved positive, the Klebs-Loeffler bacillus being found, while 33 proved negative.

Examination of post-mortem material.—Since November 1, 1899, I have embedded in paraffin and cut sections of all diseased organs in every case coming to autopsy at this hospital. Organs have been sectioned and preparations mounted from such organs. While this has entailed much work upon the laboratory, I feel that it is more than repaid by the accurate and complete pathological record which such work has enabled us to make.

The microscopical findings in the cases have been added to the post-mortem records and forwarded each month to the Surgeon-General of the Army.

Miscellaneous examinations.—Twenty-four miscellaneous examinations have been made. These examinations include work upon the influence of anæsthetics, upon the composition of the urine, and the use of nuclein in chronic malarial infection. This work will be reported upon as soon as possible.

The laboratory is well supplied with all necessary apparatus, which is in good condition.

There have not been as many special investigations carried on in the laboratory as would be desirable, or as there were opportunities for, due entirely to the time which the routine work in the laboratory requires.

HOSPITAL SHIPS.

The Relief.—During the past year the hospital ship *Relief* has been on duty in connection with military operations in the Philippine Islands. Experience had shown that this vessel did not have a sufficient coal-carrying capacity to undertake the voyage across the Pacific without some risk. She was therefore sent to Manila for duty in the Philippine waters. The following report, dated June 30, 1900, by Maj. H. O. Perley, surgeon, United States Army, to the chief surgeon, Division of the Philippines, shows the value of the services rendered by this vessel:

On January 1, 1900, the ship was lying in Manila Bay, as a floating hospital, with 107 sick and wounded officers and men, collected on our trip in December, 1899, from

Dagupan, San Fernando de Union, San Fabian, Vigan, and all ports in northwest Luzon. They were the seriously wounded and sick from the commands of Generals Young and Wheaton, who had just made very severe and exhausting campaigns in the north.

On the 13th of this month we proceeded, under your orders, to Bacoor, Niac, and Batangas, south Luzon, taking off the wounded and sick from General Schwan's command as they progressed southward, and furnishing medical and surgical supplies for the hospitals established at the different places, as well as for the moving command. From Batangas we returned to Lemeri and Taal, established a field hospital there from the supplies on board, and took off the sick and wounded. We returned to Manila January 27, having 222 patients on board. As the *Relief* had not been docked or repaired since September, 1899, it was deemed necessary that we should proceed to Hongkong (the nearest suitable place for the purpose), and in compliance with your orders we put in coal, provisions, and an abundance of medical and surgical supplies and vaccine virus. We left Manila February 7, touching at the ports of Subig, Iba, Dagupan, San Fernando de Union, Vigan, and Aparri (all seaport and garrisoned towns). We left an abundance of supplies at each place, and from Aparri went direct to Hongkong, China, where we arrived on the 13th of February, having on board at the time 73 convalescent patients. On account of the crowded condition of the dockyard we were obliged to remain three weeks, and even then the repairs were not satisfactorily done.

While in Hongkong the ship was carefully inspected by many foreign officers, both line and medical, and their admiration for her fittings and general usefulness as a floating military hospital was outspoken. We left Hongkong March 4, and revisited Aparri, Loag, Vigan, San Fernando de Union, Dagupan, Iba, and Subig on our return, taking off the patients who were selected for discharge on surgeon's certificate of disability or who required the aid of a specialist in Manila. In all, 44 patients were collected on this trip. At every place we stopped the medical department was carefully inspected and a report rendered to you.

From March 12 to 25 the ship was a floating hospital in Manila Bay. On the latter date, after having taken on an abundance of supplies, both medical and surgical, vaccine virus, and water filters, the ship started south. We had when we left Manila 8 convalescents on board.

The following ports were visited, and at each supplies as required were put off, and patients, particularly those who were selected to go to the United States and those requiring the aid of a specialist, were taken on board. Vaccine virus and water filters were furnished as needed: Nasugbu, Lemeri, Taal, Batangas, South Luzon Island; Iloilo, Kapiz, Panay Island; Bacalod, Dumaguete, Negros Island; Jolo, Sulu Island; Port Isabela, Basilan Island; Zamboanga, Cotta Bato, Dapitan, Iligan, Cagayan, Mindanao Island; Cebu, Cebu Island; Romblon, Romblon Island.

Our arrival at Cagayan, Mindanao, was very opportune. There had been an unexpected midnight attack on the garrison forty-eight hours before our arrival, and the hospital was filled with severely wounded men. These were taken on the *Relief*, their wounds re-dressed, and the patients cared for. Supplies were put off in abundance for the hospital.

It was your intention that the ship should also include the ports in Leyte, Samar, and southeastern Luzon on this trip, but the scarcity of water and our inability at the time to obtain coal rendered it necessary for us to return to Manila, which we did, arriving on the 21st of April.

The medical department of every post visited was carefully inspected by Maj. Frank R. Keefer, surgeon, United States Volunteers, who was detailed by you for this purpose. Patients were collected from the different ports. On April 26, after having taken on medical and surgical supplies, the necessary coal and water, etc., we left Manila to complete the southern trip.

The following ports were visited: Romblon, Romblon Island; Baibai, Okmoc, Leyte Island; Tacloban, Catbalogan, Kalbayok, Samar Island; Legaspi (Albai Gulf), Nueva Caceres, Tobaco, Sorsogon, Donsol, Lucena, southeast Luzon.

Supplies were furnished, the selected patients taken off, and vaccine virus and water filters were given out as required. At each station from which it was found that small substations were regularly supplied by the quartermaster's boats supplies in sets were furnished.

The *Relief* returned to Manila on the evening of May 10, and from that date to the 31st she was lying as a floating hospital in Manila Bay.

From January 1 to May 31, 1900, the ship traveled 6,375 nautical miles, and although at times in very rough weather and in uncharted regions, we have fortunately met with no accident. In coming away from the China coast we ran into a very hard blow, but the ship showed her seaworthiness.

The following table exhibits the work done:

Sick on board January 1, 1900	107
Sick on board May 31, 1900	194
Sick received between January 1 and May 31, 1900	743
Sick returned to duty between January 1 and May 31, 1900	408
Sick died on board between January 1 and May 31, 1900	10
Sick sent to United States between January 1 and May 31, 1900	69
Sick transferred to other hospitals	166

When it is remembered that only serious cases have been transferred from the post hospitals to this ship, the large number returned to duty and the small number of deaths on board illustrates better than words the necessity of a floating hospital fitted up with all modern appliances in these islands. I know of no means of treatment which will restore debilitated men, worn out with hard marching and malaria, quicker to duty than a sea trip and good food.

The special-diet kitchen on the ship has been our main reliance in the treatment of most of our chronic dysentery cases, and the results have been very satisfactory.

The value of a hospital ship in these islands can not be expressed in statistics. To be able to furnish all needed supplies to the seaport garrisons, which are otherwise inaccessible, is a matter of great importance. To take off the wounded and sick of a marching column and to meet them at designated places with all the necessary supplies, thus relieving the general commanding of anxiety for and care of the wounded, is, as one general officer expressed to me, "a marked advance in modern warfare, if not in humanity."

In concluding this report I can not but express my appreciation of the skill and care exercised by Captain Harding, sailing master, and the ship's officers and crew, in navigating the ship and in making the dangerous landings. Twice we have been under fire in bringing off the wounded, and every man of the sailing crew did his duty.

The Missouri.—As stated in my last annual report, the hospital ship *Missouri* sailed for Manila by the eastern route September 30, 1899, with a full staff of medical officers, hospital corps men and nurses, members of the Hospital Corps en route for service in the Philippines, and stores of medicines and medical and hospital supplies and property. She arrived at Manila, after an uneventful voyage, November 28, 1899, and on December 31 sailed for San Francisco, Cal., having on board 269 patients, 13 of whom died before the vessel reached her destination on February 13, 1900. Here it was reported that the repairs necessary for the continuance of this ship in service would cost a considerable sum and would occupy much time. Meanwhile the Quartermaster's Department had established a fine line of transports between San Francisco and Manila, each of which had a well-equipped hospital. Sick men in numbers not to exceed the capacity of each vessel could be returned comfortably to the United States on these transports. I herefore recommended the disuse of the *Missouri* as a hospital ship, and she was accordingly turned over to the Quartermaster's Department.

The *Terry* was at one time proposed as a suitable vessel for hospital purposes in Cuban waters; but the conditions in Cuba became so changed that it did not appear to me to be necessary to secure a hospital ship in place of the *Aid* for service in connection with the troops n garrison in that island.

HEALTH OF THE ARMY.

HEALTH OF THE ARMY IN 1898.

In my last annual report I submitted the medical and surgical statisics of the Regular Army for the calendar year 1898. It was not practicable at that time to present the statistics of the Volunteer Army for the same period. The act of Congress approved April 22, 1898, which authorized the President to raise a volunteer force, required the medical records and reports of these troops to be deposited with the Record and Pension Office. This had accordingly to be done before it was possible for the clerical force at my disposal to use the records for statistical purposes. Arrangements were subsequently made, however, with the chief of that office by which I was enabled to card and check the cases from the sick reports of the State volunteers. It was my desire to have presented these statistics as a supplement to my last annual report, but the work involved in classifying and tabulating so large a number of cases additional to those of the calendar year 1899 could not be completed until my present report became due. I therefore submit in this report the delayed statistics of the volunteer force for 1898, together with those of the Regular and Volunteer armies for the calendar year 1899.

During the year 1898, 217,072 cases of disease and injury were reported by our medical officers serving with volunteer troops. This is equivalent to 2,145.83 admissions to sick report during the year for every thousand men present in the command, or a little over two entries on sick report per man. Of this admission rate 2,037.20 were caused by disease and only 108.63 by injuries. Malarial fevers and diarrheal diseases constituted a little over one-half of the admissions, the rate for the former having been 573.56 and for the latter 453.10. The entries for typhoid fever numbered 16,796, equivalent to an admission rate of 166.03 per thousand men during the year. The rate for yellow fever was 5.58 per thousand; for measles, 61.46, and for smallpox a total of 73 cases gave a rate of only 0.72 per thousand men.

Of the 10,989 injuries reported, one-tenth were considered due to exhaustion from exposure and fatigue. It is an interesting fact that more men were ruptured than injured by gunshot. The former numbered 795, the latter 600, giving rates, respectively, of 7.86 and 5.93 per thousand of strength.

In the Regular Army in 1898 the admission rate, 2,146.94 per thousand of strength, was the same as in the Volunteer Army, but the ratios of the causes of admission were not identical. Disease caused a rate of 1,937.71, and injury 209.23. On account of the service of so large a proportion of the regular troops in Cuba, malarial infection was the cause of nearly one-third of the whole number taken on the sick reports, the admission rate for these diseases having been 694.64 cases for every thousand men of the strength. Diarrheal diseases constituted one-seventh of the cases admitted. The entries for typhoid fever numbered 4,130, equal to 88.56 per thousand men. The rate for yellow fever was 12.95, for measles 25.09, and for smallpox 0.40.

Of 9,758 injuries, only 308 were reported due to exhaustion from exposure and fatigue; 1,457 were gunshot wounds, giving a rate of 31.24 per thousand men, and 255 were cases of hernia, equaling a rate of 5.47.

The total number of discharges for disability in the Volunteer Army was 1,506, equal to an annual rate of 14.89 per thousand men. The rate for disease was 12.60; for injury 2.28. The largest individual rates were for venereal cases, 1.51; for consumption, 1.17; for hernia, 1.13, and for rheumatism 1.11.

The rate of discharge for disability among the regular troops was 11.58 per thousand men—for disease, 7.40; for injury, 4.18. Hernia occasioned a discharge rate of 1.22, rheumatism 1.05, consumption 1.01, and venereal diseases only 0.02.

The total number of deaths among volunteers admitted to sick report in 1898 was 2,851, equal to an annual rate of 28.18 per thousand men. Of these deaths 2,664, or 26.33 per thousand men, were due to disease, and 187, or 1.85 per thousand men, to injuries. Typhoid fever caused the largest number of deaths, 1,738, equivalent to 17.18 deaths per thousand men. Gunshot wounds occasioned 1.17, malarial fevers 1.96, diarrheal diseases 1.29, yellow fever 0.73, and injuries other than gunshot 0.68, leaving 5.17 for distribution among all other causes of fatality to make up the total death rate of 28.18 per thousand men during the year.

With the statements made in the last paragraph the following concerning the regular troops in 1898 may be compared:

The total number of deaths was 1,285, equal to a rate of 27.55 per thousand men. The death rate from disease was 22; from injury, 5.55. The largest individual item in the death rate was 9.74 deaths from typhoid fever in every thousand men. Gunshot wounds occasioned a death rate of 3.94; malarial fevers, 3.24; diarrheal diseases, 2.14; yellow fever, 1.50, and injuries other than gunshot, 1.61, leaving 5.38 for distribution among all other causes of fatality to make up the total death rate of 27.55 per thousand of men for the year.

In the year 1897, a year of peace, the death rate from all causes was 5.11, and the average annual rate for the previous decade was 6.99. The contrast here requires no comment.

In 1898 the volunteer troops serving in the Philippine Islands had the lowest admission rate, 1,832.10 per thousand of strength; those serving in Cuba the highest, 4,070.34, while the rate in Porto Rico, 2,175.92, did not differ much from that of the troops in the United States, 2,071.65. The high rate in Cuba was due to the excessive prevalence of malarial fevers, the rate for which alone amounted to 2,555.02, and yellow fever added 121.72 to the rate; but the admission rates for most other diseases were either not in excess or were actually lower than those of the Volunteer Army as a whole. Thus the rate for diarrheal diseases was 372 as compared with 453.10 among the volunteers generally, and that for the diseases of the respiratory organs was 43.88 as compared with 134.02. The volunteers in Cuba had also the highest death rate, equivalent to 86 per thousand of strength, the rate for disease being 73.65 and for injury 12.35, gunshot wounds having contributed 11.91 of the 12.35. The fatal diseases were typhoid fever, which caused a death rate of 22.05 per thousand men; yellow fever, which occasioned a rate of 15.88; malarial fevers, 14.77, and diarrheal diseases, 9.26, these four items constituting 61.96 of the total rate for disease—73.65.

Among the regular troops in Cuba in 1898 the death rate was exceedingly high, 98.16 per thousand men as compared with their admission rate of 2,631.76. This means that during their service on this island slight cases were infrequent, or, which is more likely, were not taken upon sick report. The death rate from disease was 61.15; from injuries, 37.01, gunshot wounds having contributed 33.33 of the latter rate. The fatal diseases were typhoid fever, which caused a death rate of 14.17; yellow fever, which occasioned a rate of 17.57; malarial infections 13.12, and diarrheal diseases 9.97.

The volunteers in Porto Rico in 1898 had a death rate of 52.09, of which 49.43 was caused by disease. Typhoid fever was the deadly factor, it being held responsible for 40.66 deaths per thousand of strength. But for this epidemic of typhoid fever among these troops their medical record would have been comparatively good.

The regular troops also suffered from this epidemic, their total death rate having been 41.45 and their rate from disease 39.38, of which 22.80 was caused by typhoid fever and 5.70 by malarial diseases.

The volunteer troops serving in the Philippines in 1898 had an admission rate of 1,832.10 per thousand men, 1,719.73 from disease, and 112.36 from injury; 422.47 from malarial diseases, and 398.63 from diarrheal diseases. The death rate, 24.70 per thousand men, was constituted by 21.27 occasioned by disease and 3.43 by injury, 2.86 of the latter being the results of gunshot injuries. Typhoid fever caused deaths equivalent to 9.28 per thousand for the year; diarrheal diseases, 2.86; smallpox, 2.14, and malarial fevers, 1.43.

Among the regular troops the death rate in the Philippines was 22.74, 18.60 from disease and 4.13 from injury, 3.10 of the latter from gunshot. Typhoid fever caused a death rate of 7.58; smallpox, 2.07, and malarial fevers and diarrheal diseases 1.72 each.

Among volunteers serving in the United States in 1898 the death rate amounted to 24.41 per thousand of mean strength for the year, of which 23.29 was due to disease and 1.11 to injury. Typhoid fever was the prominent cause of death, 16.59 of the total rate having been reported as due to it. The rate caused by malarial fevers was 1.26, by pneumonia 1, and by diarrheal diseases 0.60.

The death rate of the regulars in the United States in 1898 was 20.14, 17.45 from disease and 2.69 from injuries, of which 1.21 were from gunshot. Typhoid fever caused a rate of 8.79; malarial fevers, 2.24, and diarrheal diseases, 1.39. A large proportion of the cases which gave the high death rate from disease were imported by the regular troops from Cuba.

HEALTH OF THE ARMY IN 1899.

During the calendar year 1899 there were 229,885 admissions to sick report recorded in a mean strength of 105,546 regulars and volunteers. This is equivalent to a rate of 2,178.06 per thousand of strength, as compared with 2,146.18 per thousand during the year 1898 and with 1,236.66, the mean annual rate of the decade 1888–1897. Of the admission rate for the year, 714.99 was constituted by malarial diseases, 380.69 by diarrheal diseases, and 192.48 by injury, of which 21.56 admissions per thousand men resulted from gunshot. Typhoid fever contributed only 20.69 cases per thousand of strength. Of the admission rate for 1898, malarial fevers constituted 611.78, diarrheal diseases 388.62, injuries 140.38, of which only 13.92 resulted from gunshot. Typhoid fever contributed 141.59 cases per thousand of strength.

The number of discharges for disability in 1899, 2,320, constituted 21.98 per thousand of the strength, as compared with 14.13 in 1898 and with 16.57, the mean annual rate of the preceding ten years. The principal causes and the rates contributed by each were: Gunshot wounds

2.14, other injuries 2.33, venereal diseases 2.61, consumption 1.80, rheumatism 1.52, heart disease 1.37, malarial diseases 1.10, and diarrheal diseases 0.90. The principal causes of the discharge rate of 1898 were: Gunshot wounds 0.77, other injuries 2.11, rheumatism 1.15, consumption 1.12, venereal diseases 1.05, diarrheal diseases 0.44, and malarial fevers 0.43.

The deaths in 1899 amounted to 1,945, equal to a rate of 18.43 per thousand, as contrasted with 27.99 during the year 1898 and with 6.69, the mean of the preceding decade. The principal causes of death and the rates per thousand men contributed by them were: Gunshot wounds 5.10, other injuries 1.57, typhoid fever 2.44, diarrheal diseases 2.14, malarial diseases 0.99, pneumonia 0.94, and variola 0.80. The prominent causes of death and the rates contributed by them in 1898 were: Typhoid fever 14.83, gunshot wounds 2.04, other injuries 0.98, diarrheal diseases 1.45, malarial infections 0.97, and pneumonia 0.92.

Troops serving in Cuba had the highest rate of admission, 2,749.74 per thousand, as against 3,413.54 per thousand in 1898, the result of exposures during the active service of the Santiago campaign. The lowest admission rate during the past year, 1,677.51, was given by troops serving in the United States, but this, which must be regarded as a high rate when contrasted with the rates of the preceding years of peace, together with the still higher rate, 2,062.82, given by troops in the United States in 1898, was due to sickness brought home from service in the islands. The high rate of discharge for disability at the home stations is attributable to the same cause. The highest death rate during the past year, 30.58 per thousand men, was reported from the Pacific Islands. One-half of this was caused by injuries, gunshot injuries being responsible for the death of 12.60 men per thousand of strength. The highest death rate in 1898, 91.55 per thousand, was reported from Cuba; of this rate, 67.94 was caused by disease and 23.61 by injury, gunshot injury being responsible for the death of 21.69 men per thousand of strength.

Rates of the regulars and volunteers in 1899 compared.—During this year from the Regular Army, having a mean strength of 64,446 officers and men, there was admitted to sick report a total of 150,949 cases. This is equal to a rate of 2,342.26 per thousand of strength. Of this rate, 2,125.74 was due to disease and 216.52 to injury. Malarial diseases occasioned 633.31 of the admission rate; diarrheal diseases, 414.39. Typhoid fever caused a total of 1,481 entries, equivalent to 22.98 per thousand men. Measles gave a rate of 23.54 and smallpox a rate of 2.11 per thousand men. Of 13,954 injuries, 762 were due to fatigues and exposures, making a rate of 11.82 per thousand of strength; 1,016 cases, or 15.76 per thousand men, were gunshot injuries, and 488, or 7.57 per thousand, were cases of hernia.

During the year 1899, 78,936 cases of disease and injury were reported as having occurred in the Volunteer Army, the mean strength of which was 41,100. This is equivalent to an admission rate of 1,920.49 per thousand men, or rather less than 2 entries per man during the year. Of this rate, 1,765.72 was caused by disease and 154.77 by injury. Malarial diseases occasioned one-fourth of the admissions, the rate for these diseases being 482.02; diarrheal diseases also were prevalent, the rate being 337.26, but both of these rates are considerably smaller than the corresponding rates of 1898. The entries for typhoid fever numbered 703, equal to an admission rate of 17.10 per thousand men. Only 5 cases of yellow fever appear upon the records of this year. Measles gave a rate of 30.12 per thousand men, and 211 cases of smallpox occasioned a rate of 5.13 per thousand. Of 6,361 injuries reported, 714 were due to fatigues and exposures, making a rate of 17.37 cases per thousand of strength; 1,260 cases, or 30.66 per thousand men, were gunshot injuries, and 317, or 7.71 per thousand, were cases of hernia.

Discharges of regular soldiers on account of disability in 1899 amounted to 1,767 cases, 372 of which were cases of injury, equal to the respective rates of 27.42 and 5.77 per thousand of strength. Venereal diseases caused 3.19 of the total rate; gunshot wounds, 2.73; consumption, 2.30; heart disease, 1.88; rheumatism, 1.72, and hernia, 1.49.

The discharges on account of disability in the Volunteer Army amounted to a total of 553 cases, equal to a rate of 13.45 per thousand of strength, of which 11.02 was due to disease and 2.43 to injury. Venereal diseases caused 1.71 of this rate; gunshot wounds, 1.22; rheumatism, 1.12; consumption, 1.02, and hernia, 0.71.

The number of deaths from all causes among the troops of the Regular Army amounted to 1,202, equivalent to 18.65 per thousand of strength; 380 of the deaths, constituting 5.90 of the total death rate, were due to injury and 248, or 3.85 per thousand, to gunshot wounds. The principal diseases which caused this mortality were typhoid fever, with 180 deaths, giving a rate of 2.79 per thousand men, and diarrheal diseases, with 152 deaths, causing a rate of 2.36.

The number of deaths reported from the Volunteer Army was 743, of which 324 were due to injuries and 419 to disease. The death rate from all causes was 18.08; from disease, 10.20; from injuries, 7.88. The principal causes of this mortality were diarrheal diseases, which contributed 1.95 to the rate; typhoid fever, 1.90; smallpox, 1.44; pneumonia, 1.22; malarial fevers, 1.05, and gunshot injuries, 7.06.

The regular troops in Cuba in 1899 had a mean strength of 11,969 officers and men, from which 35,401 cases were admitted to sick report, the equivalent of 2,957.73 per thousand of strength. Of this rate, 2,690.77 was due to disease and 266.94 to injuries, only 3.09 being caused by gunshot. Malarial fevers constituted 1,132.76 of the total admission rate; diarrheal diseases, 475.82, and venereal diseases, 171.28. Three hundred and five men were discharged for disability, 234 by disease and 71 by injury, equivalent to the respective rates of 25.48, 19.55, and 5.93 per thousand of strength. Discharge was caused by venereal diseases in 3.25 per thousand of strength, in 2.59 by heart disease, in 2.51 by consumption, and in 1.17 by gunshot wounds. The death rate from all causes was 19.55, of which 17.29 was caused by disease and 2.26 by injury. Typhoid fever occasioned 63 deaths, equivalent to a rate of 5.26 per thousand men; yellow fever, 50 deaths, equivalent to 4.17 per thousand, and malarial infections, 20 deaths, equivalent to a rate of 1.67.

The volunteers in Cuba during this year, with a mean strength of 8,082, had an admission rate of 2,441.72 per thousand, of which 1,047.64 was occasioned by malarial fevers and 372.93 by diarrheal diseases. One hundred and one men were discharged from service on account of disability, 92 from disease, and 9 from injury, equivalent to the respective rates of 12.50, 11.38, and 1.11 per thousand of strength. Malarial diseases caused the relatively high rate of 5.62; venereal diseases, 1.86; consumption, 1.24, and gunshot wounds, 0.25. The death rate from all causes was 16.46, as compared with 86 during the previous year under the influences of war. Disease caused a death rate of 14.97, and injury 1.48. Only 1 death from yellow fever occurred among the volunteer troops during this year, causing a rate of 0.12 per thousand men. Malarial fevers caused the highest death rate, 3.71; typhoid fever, 2.72, and diarrheal diseases, 2.35.

The mean strength of the regulars in Porto Rico in 1899 was 3,347. In this command the admission rate for disease was 2,352.85, for injury 275.48; total, 2,628.33. Diarrheal diseases contributed 582.91 to the total rate, malarial fevers 467.28, and venereal diseases 295.18. The discharges for disability, 72 in number, were equivalent to a rate of 21.51, venereal diseases contributing 6.27 per thousand men. The death rate was only 11.35 per thousand, of which 2.19 was due to injury and only 9.26 to disease. Diarrheal diseases and typhoid fever were the prominent causes, the former having contributed 2.99 and the latter 2.69 to the rate of mortality.

Among the small number, 380, of volunteers in Porto Rico, the admission rate dropped to 1,589.47 and the death rate to 10.53 per thousand of strength, 2.63 of the latter being due to injury and only 7.89 to disease.

The regulars in the Pacific islands, with a mean strength of 22,922 in 1899, had an admission rate of 2,630.92—2,454.10 from disease and 176.82 from injury, of which 39.05 per thousand of strength was the result of gunshot. Diarrheal diseases and malarial infections constituted more than half of the cases, the former having a rate of 728.17 and the latter 705.49, a very considerable increase on the rates of 1898, respectively 431.97 and 429.56. The death rate also was higher, 31.10 per thousand of strength, of which 17.80 was due to disease and 13.30 to injury, 9.60 of the 13.30 being the result of gunshot. Diarrheal diseases caused the deaths of 5.72 men per thousand of strength, typhoid fever 3.58, malarial infections 1.23, smallpox 1, and pneumonia 0.79.

In this year the volunteers also had a higher rate of admission than in 1898, due to an increased prevalence of diarrheal and malarial diseases. The death rate from all causes was equal to a loss of 29.83 men per thousand of strength during the year, but only 11.80 of this was caused by disease. Injuries were responsible for 18.03 of the admission rate, of which 16.81 resulted from gunshot. The prominent fatal diseases were smallpox, which caused 3.36 deaths per thousand men, diarrheal diseases 3.18, typhoid fever 2.20, pneumonia 1.14, and malarial infections 0.43.

The regulars at the home posts had a mean strength of 26,208 in 1899. The admission rate for this command was 1,772.17 per thousand of strength—1,551.47 for disease and 220.70 for injury; 363.37 of the rate was due to malarial infections, mostly the result of foreign service. The death rate was light, only 6.72 from disease and 1.56 from injury; a total of 8.28 per thousand of strength for the year.

The volunteers at the home posts, with a mean strength of 15,984, had an excellent record, which compares favorably with that of the Regular Army in times of peace. The death rate from all causes was only 7.26 per thousand men, 0.94 due to injury and 6.32 to disease. The chief items constituting this death rate were pneumonia 2.38, typhoid fever 1.19, diarrheal diseases 0.38, and malarial fevers 0.37.

The following tabulation presents many interesting points relating to the mortality among our troops during the past two years:

Annual death rates per thousand of strength among volunteer and regular troops serving i Cuba, Porto Rico, the Philippine Islands, and the United States during the years 189 and 1899.

Deaths.	Cuba.				Porto Rico.			
	1898.		1899.		1898.		1899.	
	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.
All causes	86.00	98.16	16.46	19.55	52.09	41.45	10.53	11.3
All injuries	12.35	37.01	1.48	2.26	2.66	2.07	2.63	2.0
Gunshot injuries	11.91	33.33	.62	.92	1.86	1.04	....	.0
All diseases	73.65	61.15	14.97	17.29	49.43	39.38	7.89	9.2
Typhoid fever	22.05	14.17	2.72	5.26	40.66	22.80	2.63	2.6
Yellow fever	15.88	17.57	.12	4.17	....	....	....	....
Smallpox	....	....	.25	.08	.27	.52	....	....
Malarial fevers	14.77	13.12	3.71	1.67	2.92	5.70	....	....
Diarrheal diseases	8.60	9.97	2.35	.83	1.06	2.07	....	2.9
Pneumonia	.66	.26	1.36	.75	.27	.52	....	.3

Deaths.	Philippine Islands.				United States.			
	1898.		1899.		1898.		1899.	
	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.
All causes	24.70	22.74	29.83	31.10	24.41	20.14	7.26	8.2
All injuries	3.43	4.13	18.03	13.30	1.11	2.69	.94	1.5
Gunshot injuries	2.86	3.10	16.81	9.60	.43	1.21	.62	.57
All diseases	21.27	18.60	11.80	17.80	23.29	17.45	6.32	6.7
Typhoid fever	9.28	7.58	2.20	3.58	16.59	8.79	1.19	.9
Yellow fever	....	....	....	....	.01	.08	....	.11
Smallpox	2.14	2.07	3.36	1.00	....	....	.12	.0
Malarial fevers	1.43	1.72	.43	1.23	1.26	2.24	.37	.1
Diarrheal diseases	2.86	1.72	3.00	5.72	.60	1.39	.38	.0
Pneumonia	1.14	.69	.06	.79	1.00	.92	2.38	.8

Relative prevalence of disease among white and colored troops.—During the past two years the rates of admission to sick report and of discharge for disability were practically the same among the white and the colored troops. The death rates from all causes were, however, somewhat lower among the latter, notwithstanding a loss of 5.13 per thousand of strength from injury in 1898, as against 2.91 among the white troops.

Although the admission rates were practically the same for both races, some differences may be observed in the items which make up the totals. Thus the colored troops had relatively fewer cases of measles, mumps, smallpox, diphtheria, cerebro-spinal fever, typhoid fever (see page 224), and alcoholism, with considerably less of diarrheal diseases, than the white troops. For alcoholism the rates of admission were only 2.94 and 5.65 in 1898 and 1899 among the colored troops, as compared with 8.95 and 15.11 among the white troops. For diarrheal diseases the rates of the colored troops during these two years were 168.11 and 164.96, as compared with 400.24 and 395.99 among the whites. On the other hand, the negro troops slightly exceeded the white troops in their admission rates for yellow fever, malarial fevers, erysipelas, rheumatic fever, consumption (see page 274), diseases of the respiratory organs, and very considerably in their rates for venereal diseases. Among the colored troops in Cuba in 1898 there were 232 cases of yellow fever, with 36 deaths, giving the respective rates of 146.19 and 22.68 per thousand of strength, while the corresponding rates for the white troops serving in Cuba at the same time were 132.58 and 15.24. It is to be noted, however, that the unusual prevalence of this disease among the colored troops was due to special influences affecting one regiment, the Twenty-fourth United States Infantry. One hundred and sixty-seven of the cases and 23 of the deaths occurred in this regiment, concerning which Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, reported, August 24, 1898:

> I was much embarrassed in taking care of the sick by the lack of nurses and proper guards, and applied twice to the general commanding the Fifth Army Corps for troops to perform this duty, but he declined to furnish them. On my appeal to General Miles, however, he promptly ordered the whole of the Twenty-fourth Infantry to report to me for duty. This regiment made a night march, arriving at Siboney early the next morning. The necessity for aid was so urgent that I requested the commanding officer to call for volunteers from that regiment to serve in the yellow fever hospitals. This request brought forth a prompt response, more that twice the number of men required volunteering for this perilous duty. I desire to bring to the notice of the General Commanding the Army the conduct of these men. The cheerfulness with which they did their duty under the most adverse circumstances, and the promptness with which they volunteered for any service with the sick deserves, in my opinion, a special commendation.

An excess of malarial infections among the colored troops is observed in the statistics for the years 1898 and 1899, when the rates for the white and the colored troops of the whole Army are compared. The admissions for the white troops were equal to an annual rate of 591.44, and for the colored troops to a rate of 675.77, per thousand men of each race. This, however, does not imply a greater susceptibility on the part of the colored men, but is referable to the fact that during a part of the time all the colored regiments were exposed to Cuban malaria, while only a relatively small proportion of the large force of white troops was similarly exposed. To ascertain relative susceptibility of the two races we must compare the rates of troops operating in the same malarious localities. In 1898 the admission rate for malarial diseases of the Regular Army in Cuba, including two infantry and two cavalry regiments of colored troops, was 1,174.94 per thousand of strength, but the rate of the colored regiments was only 768.53.

Venereal diseases in 1898 caused 149.58 admissions per thousand of strength among the colored men, and in 1899 195.92, as against 78.48 and 128.59 among the white troops during these years.

Seasonal prevalence of disease.—With a mean monthly admission rate of 165.46 for all diseases in 1899, the seasonal curve for the Army as a whole began in January with the high rate of 178.04 per thousand of strength. It fell in February and March, and in April reached a minimum of 140.54. During the next four months the rate rose to the maximum of the year, 179.78, in August. In September the rate fell below the mean, but rose to about the level of the latter during the last three months of the year. There is little to be learned from a study of this curve of prevalence, for the climatic and other influences which affected it were too complex to be considered from this point of view.

Even when we compare the prevalence of disease among troops in the United States in 1899 with the recorded prevalence in former years, differences are found which are evidently not due to climatic conditions in this country, but to previous service of the troops in other climates.

During the decade 1888–1897 the monthly admission rate was usually high in January from influenza and bronchitic attacks. From this point it fell to a minimum in April, after which it rose, slowly during May and June, and rapidly in July and August, to the maximum of the year. It remained high in September, but fell again during the last three months of the annual period. The wave of prevalence during the months of July, August, and September was due to malarial diseases. Prior to the decade mentioned this autumnal wave was larger than in recent years, and there was frequently a slight prominence in the curve in May or June, corresponding with a sudden increase of cases of intermittent fever. During the past year the curve of prevalence of disease among United States troops in garrison in the United States changed considerably from the characteristic curve of former years. The mean monthly rate of admission was 124.73, due to large rates in January, February, and March; the maximum in January, 180.61. The rates of all the other months were below the mean, the lowest having occurred in July and December, 80.84 and 80.38. The large rates of the first three months of the year were caused in part by diseases of the respiratory organs, and very considerably by recurrences of malarial affections contracted in Cuba and Porto Rico during the year 1898. The death rate was above the mean monthly rate of the year during the first five months and below the mean during the remaining months. The larger death rates of the earlier months were due to pneumonia and typhoid fever.

The following table shows the prominence of certain diseases among the troops stationed in the United States in 1899. Similar tables relating to troops in the Philippines, Cuba, and Porto Rico will be found on pages 87, 167, and 187.

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	82	0.91	12	0.13	19	0.33	3	0.05	21	0,44	1	0.02
Malarial infections	3,161	35.05	1	.01	1,721	29.94	1	.02	1,412	29.61	1	.02
Undetermined fevers	60	.67			38	.66			19	.40		
Rheumatic affections	683	7.57			374	6.51			269	5.64	1	.02
Consumption	17	.19	4	.04	16	.28	1	.02	12	.25		
All venereal diseases	1,078	11.95			620	10.78			502	10.53		
Alcoholism and direct results	97	1.08	3	.03	72	1.25	1	.02	44	.92		
Diarrheal diseases	497	5.51			232	4.04			245	5.14	1	.02
Pneumonia	112	1.24	17	.19	73	1.27	13	.23	70	1.47	17	.36
Total respiratory	2,866	31.78	17	.19	1,577	27.43	13	.23	1,208	25.33	17	.36
All diseases	16,286	180.61	65	.72	8,605	149.69	39	.68	7,245	151.90	34	.71

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	34	0.71	7	0.15	34	1.04	5	0.15	27	1.05	1	0.04
Malarial infections	1,311	27.47	3	.06	898	27.58			410	16.00		
Undetermined fevers	47	.98			21	.64			18	.70		
Rheumatic affections	208	4.36			201	6.17			155	6.05		
Consumption	6	.13	2	.04	11	.34	4	.12	7	.27		
All venereal diseases	447	9.37			359	11.03			333	13.00		
Alcoholism and direct results	43	.90	4	.08	43	1.32	1	.03	36	1.41		
Diarrheal diseases	378	7.92			307	9.43			310	12.10		
Pneumonia	39	.82	5	.10	14	.43	2	.06	7	.27		
Total respiratory	719	15.07	6	.13	373	11.46	2	.06	176	6.87		
All diseases	5,358	112.26	38	.80	3,837	117.84	25	.77	2,676	104.44	10	.39

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	39	1.19	1	0.03	41	1.09	2	0.05	111	2.49	5	0.11
Malarial infections	414	12.59	....	....	984	26.25	....	....	980	21.94	3	.07
Undetermined fevers	22	.67	....	....	44	1.17	....	....	34	.76	....	....
Rheumatic affections	106	3.22	....	....	162	4.32	....	....	171	3.83	....	....
Consumption	15	.46	2	.06	7	.19	....	....	12	.27	1	.02
All venereal diseases	328	9.97	....	....	375	10	....	....	329	7.37	....	....
Alcoholism and direct results	31	.94	....	....	32	.85	....	....	51	1.14	....	....
Diarrheal diseases	459	13.96	1	.03	700	18.68	....	....	456	10.21	2	.04
Pneumonia	16	.49	1	.03	10	.27	1	.03	11	.25	....	....
Total respiratory	151	4.59	1	.03	213	5.68	1	.03	253	5.66	2	.04
All diseases	2,658	80.84	12	.36	4,178	111.46	5	.13	3,922	87.81	16	.36

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	29	0.73	5	0.13	15	0.52	1	0.03	6	0.28	2	0.09
Malarial infections	561	14.19	....	....	279	9.59	....	....	142	6.64	....	....
Undetermined fevers	30	.76	....	....	13	.45	....	....	6	.28	....	....
Rheumatic affections	256	6.47	....	....	182	6.26	....	....	150	7.01	....	....
Consumption	16	.40	1	.03	13	.45	....	....	2	.09	....	....
All venereal diseases	420	10.62	....	....	344	11.83	....	....	238	11.13	....	....
Alcoholism and direct results	28	.71	1	.03	58	1.99	....	....	33	1.54	2	.09
Diarrheal diseases	271	6.85	2	.05	106	3.64	....	....	66	3.09	1	.05
Pneumonia	22	.56	2	.05	18	.62	1	.03	9	.42	....	....
Total respiratory	394	9.96	2	.05	366	12.59	1	.03	241	11.27	....	....
All diseases	3,783	95.66	14	.35	2,888	99.30	8	.28	1,719	80.38	11	.51

CAMPS OF UNITED STATES VOLUNTEER REGIMENTS IN THE UNITED STATES.

In preparing the camps in which the United States volunteer regiments were organized the utmost care was taken to provide for the comfort and well-being of the men. The tentage consisted, generally, of conical wall tents, with an average of 8 men to a tent. The streets were wide and the tents along each side were placed at the width of a tent apart. All the tents were floored, the flooring well raised from the ground. Special latrines were provided, the contents of which were regularly flushed into a sewerage system or emptied by an odorless excavator. Policing was done by civilian labor. Water supplies were furnished from good sources and delivered by faucet in convenient places. Bath houses, with hot and cold water, gave the needful facilities for personal cleanliness. The kitchens and mess rooms were carefully supervised and the general sanitary conditions were excellent. I submit in this place two reports, one showing the condition of the Thirty-Fifth, the other of the Forty-Fifth United States Volunteer Infantry.

REPORT ON THE SANITARY CONDITION OF THE THIRTY-FIFTH UNITED STATES INFANTRY VOLUNTEERS, AT VANCOUVER BARRACKS, WASH., AUGUST 31, 1899, BY MAJ. R. G. EBERT, SURGEON, UNITED STATES ARMY.

The camp as now occupied was partially planned for the muster out of the Second Oregon. The tentage and grounds of the First Battalion and the field hospital in the post hospital inclosure were erected for that purpose. The various camp sites are on a gentle southern slope, with a fall of about 4 feet per 100, soil gravelly, covered with natural sod, readily absorbing moisture, and, with the exception of the neighborhood of the latrines of the Second Battalion, well drained, as proved by recent storms. Camp of Third Battalion is entirely in the open; of Second adjoining a small grove of locusts and some scattering maples; of First in the open ground. Tentage is all floored and raised above the ground. Second and Third battalions are in Sibleys, with 8 or 9 men in a tent; First Battalion in A wall tents, 3 men to a tent. Bedsacks and straw are furnished. At present no means of heating is provided, though floors are arranged for Sibley stoves in the conical wall tents.

The kitchens are beneath open sheds, 12 by 12 feet, and have complete field outfits; mess sheds, 60 by 20 feet, at opposite end of street to latrines. Ample tables and benches are provided for each organization. Water at each kitchen, the hydrant being under absolute control of cook, by removal of handle of faucet and placing it in his charge to prevent unauthorized use and consequent muddiness of ground; drippings caught in buckets. Meat safes, 48 by 36 by 30 inches, with screened sides and doors, located above ground, have been furnished, to prevent contamination of food by flies and to allow free access of air. Kitchen refuse, when not burned, is placed in a covered receptacle, which is emptied twice daily, or oftener if necessary; barrels scalded at each emptying and washed with hydrate of lime; attention is also given to the cleanliness of lids and the outer surface of barrels. All refuse of kitchen is removed in closed sanitary carts and dumped in the deep water of the Columbia River. Thorough cleanliness of all surroundings of kitchen and camp is constantly dwelt upon, and when ground is accidentally soiled by spilling of dishwater it is immediately covered with fresh earth or ashes.

Each company of the Second and Third battalions has latrines 10 by 20 feet, accommodating 14 persons. This consists of two zinc-lined troughs, 14 feet by 25 by 17 inches, with a fall of 4 inches, to assure free flushing. Water is admitted at upper end by faucet, while the escape into sewer, properly trapped, is by "Demorest valve." Both entrance and outflow are under control of civilian employees, being guarded by lock and key to prevent unauthorized meddling. The troughs are emptied twice daily, the water standing at least 3 inches deep in the shallowest places, mixed with hydrate of lime, and this is stirred at frequent intervals (paddles or brooms kept in a solution of lime). Toilet paper only is allowed to be used, and is supplied freely by the Quartermaster's Department. Urinals, constantly flushed with water and properly "limed," are connected direct with sewer, with due precaution as to trapping. Sewer ventilation is by standpipe, extending above each latrine.

The First Battalion has but two latrines, one for each two companies; these having been constructed earlier, have smaller troughs, but are similar in sanitary arrangement. Urine tubs, two to each company, provided with hydrate of lime, are placed in streets at tattoo and removed and cleaned at reveille. The commanding officer of the regiment has been requested to give necessary orders for their proper use.

On the outer wall of each latrine a zinc-lined trough 20 feet by 18 by 4 inches, water supplied by four faucets, serves for lavatory purposes. Three companies of the First Battalion have lavatory at different places than latrines, but all are connected with sewer. The latrines and police of grounds are attended to by civilian employees of the Quartermaster's Department. One caldron of 75 gallons' capacity is furnished each battalion for laundry purposes. The bath room is a model, and a permanent addition to the post. The building is well constructed and is 23 by 40 feet, with annex 16 by 25 feet for steam tubular boiler of 40-horsepower capacity (size of boiler, 44 inches in diameter and 10 feet long). The system is the "Gegenstrom." On a concrete floor, sloping to a central drain properly trapped and connected with sewer, are erected 48 closets, each 3 by 4 feet, 12 each on north and south wall directly facing similar ones in the center of the building. Those in the center are for bathing, and those on the outer wall for dressing. Shower baths, temperature from 52 to 115 degrees, can be given to either 4 or 24 men at one time. The regulation of temperature and the flow of water is in the hands of a civilian attendant, a thermometer showing the absolute degree of heat. Allowing four minutes each for undressing and dressing, and six minutes for bathing, the capacity of the house is 96 men per hour. Baths are now ordered at from 93 to 95 degrees, finishing with a final dash of cold water. The house is open from 8 a. m. to 5 p. m. All closets being on iron supports 6 inches above the ground, thorough cleanliness is assured. Steam radiators will be necessary in the winter. Ventilation is properly provided.

The food supply is that authorized by regulations, and is of good quality. The post bakery is furnishing bread, but its capacity is hardly equal to the demand, and in the rapid baking the bread has not always been the best. Field ovens should be established, or if a permanent increase in the strength of the command to present proportions is contemplated, then an addition to the present plant should be made. The cooking, as a rule, is satisfactory. Some of the recruits stated that food was insufficient; this complaint is probably based on the fact that the exercise of drill has caused a more healthy assimilation in the sluggish, and possibly some temporary lack of experienced management while companies were being organized may have been in operation. Frequent inspections have shown but few instances where this complaint was justified, and never in an organized company. Attention has been invited to restricting men in the indulgence of unripe fruit, and the sick report has been materially increased by the nonobservance of this matter.

The water supply of this post can be brought to 320,000 gallons per day. Former analyses show it almost absolutely pure, and for the present strength of command it is more than ample.

The clothing issued is not entirely satisfactory. Leggings are of poor material and workmanship; complaint has been made of the eyelet pulling out and the straps breaking. Shoes, both black and russet, are too low in the instep for many individuals. Socks are said to be of inferior quality. Some complaint has been made of the blouses, both in regard to quality and workmanship. To recruits just joining there should be an issue of towels, as without them and with no money to buy, it seems that cleanliness must suffer. The khaki is said to be of good quality; the same can be said of underclothing and blankets.

Habits of the men seem to differ as to the locality from which they were recruited. As a rule, the men from the Western States are a more desirable class. Under the constant drill and discipline imposed by the commander of the Thirty-fifth Infantry, there is a daily improvement not only in the soldierly appearance, but in the moral tone.

Besides the Thirty-fifth Infanty, there are at this post 538 volunteer recruits. These are quartered in barracks and organized into casual companies. The number of men assigned to each building is in excess of that for which the building was intended, and to remove any possible bad effect of overcrowding, it has been recommended that all upper sashes of windows be lowered at least 4 inches, to insure an abundance of fresh air. As soon as these recruits are received at post they are bathed, but owing to an insufficient supply of clothing—it having been expected that but 1,309 men would be sent here—these men are waiting for uniforms, for which telegraphic requisitions have been duly made.

The sanitary condition of the post is shown as follows: Regulars present, 132; sick, 0. Volunteers present, 1,859; sick, 27. Of these 27 cases 7 are injuries, 4 venereal diseases, 6 malarial diseases, and 10 miscellaneous.

SANITARY CONDITION OF THE CAMP OF THE FORTY-FIFTH UNITED STATES INFANTRY VOLUNTEERS, AT FORT SNELLING, MINN., SEPTEMBER 27, 1899, REPORTED BY LIEUT. COL. H. R. TILTON, CHIEF SURGEON, DEPARTMENT OF DAKOTA.

The camp is well located on a high plateau, and extends in a northeast and southwest direction. The surface covered by the companies and band measures 172 feet by 988 feet. The entire camp, including regimental headquarters, battalion officers' tents, companies, and latrines, occupies a surface of not quite 10 acres. The tentage provided has been most liberal; 14 conical wall tents for each company allows 1 conical tent for 8 men, besides giving a first sergeant a separate tent. The tents have all been provided with floors, and arrangements are being made for heating stoves. Water from the Fort Snelling waterworks has been piped to each company, one faucet being at the company kitchen, the other near the latrines. The latrines have only been in use a short time, and, so far as I observed, they admirably serve the purpose. One difficulty is the supply of toilet paper. For the satisfactory working of the latrines, newspapers and the coarser kinds of paper which float above the surface are objectionable. So soon as a company can provide a fund by saving on surplus rations and profit of the canteen, such necessary articles can be purchased out of the company fund. When a regiment is organizing, with no fund available, some provision ought to be made to bridge over the period intervening until a fund can be made. Now the Subsistence Department is authorized to provide toilet paper for prisoners, but for no other portion of the command. A bath house has been constructed with capacity for 24 shower baths. The boiler has not yet arrived, and until it is put up the men have no facilities for bathing nearer than the barrack bathrooms. A place for washing faces and hands in connection with the bathing arrangements would add much to the comfort of the men, and in this connection hot water should be provided for washing the individual mess kits after each meal. This is usually provided by means of a camp kettle over a pit and open fire, but this requires turning up the soil, and the design in the present camp is to avoid digging up the soil as much as possible.

The company kitchens, as well as the hospital and band, have been provided with the Donavin-Myers field range. This is made of sheet steel with cast-iron top, and measures 21 by 21 by 39 inches, and is a most convenient and economical method for use in the field, although such a range could not be carried with a pack train, while the Buzzacott cooking oven and stove is more portable. I saw the cooking arrangements and the serving of dinner, which was well prepared. The bacon was excellent. The garbage is received in galvanized iron barrels, and contents removed twice daily. The contents of the latrines are removed once daily by means of an odorless excavator. This work is done by a contractor. A galvanized-iron barrel is to be placed in each company street for use as a urinal at night, and removed each morning.

The hospital has the full allowance of tents, and floors were being brought into camp for the hospital, and stoves were also to be put up. Only two mild cases of disease were in the hospital, which is provided with 10 cots. One was a case of intermittent fever and one a case of sore throat. The hospital has its complete outfit of medical and surgical appliances. Two thousand first-aid packages have been called for, and authority has been given to purchase the necessary quicklime and crude carbolic acid for use in all the latrines in camp. The regiment has its authorized 3 hospital stewards and 8 hospital corps privates; 4 more privates will be required to complete the full allowance. All the men in the command have been vaccinated.

The only criticism I have to make as to the arrangement of the camp is that, in my opinion, where the ground will permit, at least 20 acres should be occupied by a regiment of 1,200 men.

DIVISION OF THE PHILIPPINES

HEALTH OF THE TROOPS.

In the Philippine Islands, in 1898, with a mean strength of 9,907 regulars and volunteers, the admission rate for all causes of disability was 1901.99 per thousand of strength; for disease, 1776.72; for injury, 125.26; for gunshot injury, 13.02. The death rates corresponding to these admission rates were respectively 24.12, 20.49, 3.63, and 2.93. Malarial fevers contributed the largest proportion, 424.55, to the admission rate, but only 1.51 to the death rate. Typhoid fever, though forming only 83.77 of the admission rate, caused 8.78 of the 20.49 deaths from disease per thousand of strength, the cases numbering 830 and the deaths 87. Diarrheal diseases gave an admission rate of 399.60, with a death rate of 2.52 per thousand men. The number of cases was 3,959 and deaths 25. Seventy-five cases of smallpox, of which 21 were fatal, gave rates, respectively, of 7.57 and 2.12 per thousand of strength.

In 1899, with a mean strength of 39,280 regulars and volunteers, the admission rate for all causes of disability was 2395.52 per thousand of strength; for disease, 2206.36; for injury, 189.16; for gunshot injury, 52.26. The death rates corresponding to these admission rates were, respectively, 30.58, 15.28, and 12.60. Although the admissions for disease were considerably increased during this year, 2206.36 per thousand men as compared with 1776.72 in 1898, and although the death rate from all causes 30.58 as compared with 24.12 in 1898, the death rate from disease became reduced from 20.49 to 15.30 per thousand men. The increased admission rate was due to diarrheal diseases, malarial infections, and injuries. Diarrheal diseases formed 642.80 and malarial infections 624.37 of the total admission rate. The lessened rate of mortality from disease resulted from a lessened prevalence of typhoid fever, with a consequent lowering of the death rate from that disease. Eight hundred and sixty-two cases of this fever, of which 118 were fatal, gave an admission rate of 21.95 and a death rate of 3 per thousand of strength. The lower death rate was also in part due to the milder character of the malarial infections, the death rate from these diseases being only 0.89 as compared with 1.51 in 1898. These influences lowered the death rate from disease, notwithstanding a very material increase in the malignity of the diarrheal diseases, which gave a death rate of 4.58 per thousand men as compared with 2.52 during 1898. The increase in the totality of the death rate was the consequence of active service as expressed by the mortality rate for gunshot injury, 12.60 per thousand of strength as compared with 2.93 during the previous year. Two hundred and sixty-seven cases of smallpox, 78 of which were fatal, gave rates, respectively, of 6.80 and 1.99 per thousand of strength.

Seasonal prevalence of disease.—In the Philippine Islands in 1899 the mean monthly rate of admission for disease was 183.86. In January the rate was considerably below this mean. The minimum, 93.08, was reached in February, after which the rates rose slowly in March and April and rapidly in May and June until the maximum, 223.56, was reached in July. The rates fell slowly during the remaining months of the year. The rapid increase from May to July was due partly to malarial infections, but chiefly to diarrheal diseases. Lessened prevalence of the latter during the later months lowered the rate of admission, notwithstanding continued high rates for malarial infections. But it can not be inferred from these records that the first four months of the year constitute the healthy season, while the second four are characterized by a maximum prevalence of diarrheal diseases, and the last four by a maximum prevalence of malarial fevers, because among the unsanitary influences affecting the troops during this year were those of active and exhausting field service, which certainly exercised a considerable modifying effect on those of climate and season.

The mean monthly death rate from disease was 1.28 per 1,000 of strength. The rate was considerably below this during March, April, May, and June. In July and December the rates differed but little from the mean. During the other months they were higher than the mean, that for September, 1.84, being the highest; and all may be said to have been due to the increased fatality of diarrheal diseases. The following table shows the prevalence of certain diseases by months in these islands:

Seasonal prevalence of disease among troops in the Philippine Islands during the calendar year 1899.

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	44	1.93	6	0.26	24	0.84	5	0.17	34	1.14	5	0.17
Malarial infections	572	25.05	....	....	591	20.60	....	....	955	32	....	....
Undetermined fevers	70	3.07	....	....	48	1.67	....	....	55	1.84	....	....
Rheumatic affections	148	6.48	....	....	141	4.92	....	....	259	8.68	....	....
Consumption	8	.35	....	....	2	.07	1	.03	11	.37	1	.03
All venereal diseases	302	13.23	....	....	283	9.87	....	....	313	10.49	....	....
Alcoholism and direct results	18	.79	....	....	3	.10	....	....	17	.57	....	....
Diarrheal diseases	468	20.50	....	....	477	16.63	6	.21	896	30.02	5	.17
Pneumonia	6	.26	....	....	12	.42	1	.03	3	.10	3	.10
Total respiratory	125	5.47	....	....	213	7.43	1	.03	229	7.67	3	.10
All diseases	2,793	122.32	31	1.36	2,670	93.08	40	1.39	3,975	133.19	29	.97

Seasonable prevalence of disease among troops in the Philippine Islands during the calendar year 1899—Continued.

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	50	1.56	2	0.06	75	2.09	12	0.33	142	3.70	11	0.29
Malarial infections	922	28.85	1	.03	1,223	34.12	2	.06	1,223	31.90	....	....
Undetermined fevers	59	1.85	....	....	75	2.09	....	....	73	1.90	....	....
Rheumatic affections	256	8.01	....	....	227	6.33	....	....	238	6.21	....	....
Consumption	12	.38	2	.06	16	.45	....	....	20	.52	2	.05
All venereal diseases	349	10.92	....	....	369	10.29	....	....	337	8.79	....	....
Alcoholism and direct results	14	.42	....	....	21	.59	2	.06	10	.26	....	....
Diarrheal diseases	1,280	40.05	4	.13	3,068	85.58	6	.17	3,731	97.32	6	.16
Pneumonia	9	.28	1	.03	13	.36	....	....	8	.21	2	.05
Total respiratory	165	5.16	1	.03	166	4.63	....	....	209	5.45	2	.05
All diseases	4,322	135.23	22	.69	6,986	194.87	33	.92	7,700	200.85	30	.78

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	81	2.03	15	0.38	78	2.01	15	0.39	94	2.40	13	0.33
Malarial infections	1,602	40.20	4	.10	2,044	52.59	1	.03	2,150	54.92	3	.08
Undetermined fevers	87	2.18	....	....	118	3.04	....	....	193	4.93	....	....
Rheumatic affections	250	6.27	....	....	287	7.38	....	....	215	5.49	1	.03
Consumption	14	.35	2	.05	22	.57	5	.13	17	.43	5	.13
All venereal diseases	301	7.55	....	....	356	9.16	....	....	353	9.02	....	....
Alcoholism and direct results	19	.48	1	.03	13	.33	1	.03	34	.87	1	.03
Diarrheal diseases	4,282	107.44	16	.40	3,086	79.39	15	.39	2,134	54.51	26	.66
Pneumonia	15	.38	1	.03	15	.39	2	.05	11	.28	6	.15
Total respiratory	253	6.35	1	.03	173	4.45	3	.33	203	5.19	8	.20
All diseases	8,910	223.56	49	1.23	8,466	217.80	59	1.52	7,981	203.87	72	1.84

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	79	1.64	10	0.21	78	1.42	7	0.13	83	1.32	17	0.27
Malarial infections	3,345	69.44	5	.10	4,641	84.69	6	.11	5,257	83.44	13	.21
Undetermined fevers	176	3.65	....	....	321	5.86	....	....	180	2.86	....	....
Rheumatic affections	191	3.97	....	....	226	4.12	1	.02	225	3.57	....	....
Consumption	16	.33	6	.12	16	.29	5	.09	22	.35	2	.03
All venereal diseases	407	8.45	....	....	546	9.96	....	....	671	10.65	....	....
Alcoholism and direct results	29	.60	....	....	32	.58	....	....	37	.59	3	.05
Diarrheal diseases	2,140	44.43	31	.64	1,868	34.09	34	.62	1,819	28.89	31	.49
Pneumonia	19	.39	2	.04	6	.11	....	....	20	.32	1	.02
Total respiratory	225	4.67	3	.06	228	4.16	1	.02	353	5.60	2	.03
All diseases	9,955	206.67	69	1.43	10,878	198.50	70	1.28	12,030	190.95	97	1.54

Medical officers in the Philippines, as elsewhere, have been earnest in their recommendations for the welfare of the men, and commanding officers have usually acted promptly, so far as lay in their power, to carry the recommendations into effect. It has been difficult, however, and, indeed, impracticable to control many of the insanitary conditions, particularly during the progress of the campaign against the insurgents. In many localities the ground was saturated with water, and drainage impossible. Efforts have been made to prevent the troops from frequenting the houses of low-class natives, where infectious diseases are exceedingly common. Special attention has been given to the quarters of the men and to the care of the sinks and earth closets, to the purification of the drinking water, to the supply and preparation of food, the supervision of the laundry work, and the installation of shower baths where there were no other facilities for bathing.

The exposures, fatigues, and excitements of a prolonged campaign are responsible for the large sick report and the relatively large death rate among the troops in the Philippines. The difference is said to have been startling between the sick rate of regiments at the front doing constant outpost duty, subject to night attacks, and having to make periodical advances through difficult country, and that of regiments doing garrison duty at towns in the rear. This difference has been manifested even where the permanent stations have been in insanitary localities. A battalion at Candaba, a badly drained town with insanitary surroundings, had a sick rate of only 8 per cent, while at the same time troops at Angeles, a well-drained town with a sandy soil, gave a rate of 25 per cent. The troops at Candaba had been on ordinary garrison duty for some time, while those at Angeles had fought their way from San Fernando by successive attacks.

Indeed, the opinion is prevalent among our medical officers that in time of peace and doing only garrison duty the sick rate of the Army in the Philippine Islands would be no higher than it ordinarily is in the Southern United States.

The latest reports received from the chief surgeon, Division of the Philippines, dated August 15, 1900, show a percentage of 8.47 sick for the command, which on that date had a strength of 60,554. There were:

Sick in quarters	1,261
Sick in regimental hospitals	1,119
Sick in military hospitals in departments	1,241
Sick in Manila hospitals	1,508
Total sick	5,129

The general character of the diseases affecting the troops may be gathered from the following statement, consolidated from the reports of the military and Manila hospitals for August 11, 1900, including a total of 2,807 cases:

Diseases.	Number of cases.	Percentage of total sick.	Diseases.	Number of cases.	Percentage of total sick.
Typhoid fever	56	1.99	Heat exhaustion	5	.17
Malarial fever	605	21.55	Venereal diseases	271	9.65
Dysentery	403	14.35	Measles	5	.17
Diarrhea	463	16.40	Undetermined	99	3.53
Other intestinal diseases	50	1.74	All other diseases	516	18.38
Gastric disorders	96	3.42			
Wounds and injuries	238	8.47	Total	2,807	100

It has been found that in men suffering from dysentery convalescence is slow and recurrences frequent, and that in the event of such recurrences ultimate recovery becomes exceedingly doubtful while the individuals remain in the tropical climate. Rheumatic affections do not improve and the course of consumption is rapidly progressive, according to the experience of medical officers on duty in the large hospitals in Manila. These cases have, therefore, been sent with advantage to the United States for treatment in the general hospital, Presidio of San Francisco, Cal.; the army and navy general hospital at Hot Springs, Ark., and the general hospital for consumption at Fort Bayard, N. Mex.

There are no doubt locations in the Philippines where such cases could be treated with favorable results, but our medical officers have not yet had a sufficient experience of the sanitary conditions and prevailing diseases of the different sections of the islands to enable them to make recommendations as to the selection of sites for convalescent hospitals in which such cases as are now sent to the United States might rest and recuperate.

Field service of the troops.—In my last annual report I described the broken-down condition of General MacArthur's division on its arrival at San Fernando, in May, 1899, after an exhausting campaign which had lasted continuously since the insurgent outbreak on February 4 of that year. During the following autumn military operations were conducted on a relatively large scale, the regiments being brigaded and organized into two divisions. Campaigns were carried on in Cavite Province, in the Valley of the Rio Grande de Pampango and beyond, and many excursions were made into hostile territory. In Negros and Cebu exhausting marches were made in mountain districts, and in Panay there was a sharp campaign. In the late autumn the northern part of Luzon was occupied. All these movements were associated with great fatigues and hardships.

First aid during this field service was usually limited to the hand litters and the possibilities of the first-aid packets and Hospital Corps and orderly pouches, but as the number of wounded in any one engagement was generally small as compared with the number of troops engaged and the consequent number of medical officers and Hospital Corps men available, every care was given to the individual cases. It may be here stated that a profound impression was made on the more intelligent class of Filipinos by the kindness of our soldiers to their wounded. Several medical officers have commented upon this. Filipino prisoners observed that their wounded, when in our hands, were dressed and cared for as if they belonged to our own Army, and this even when we had to leave them behind on account of the military necessity.

An ambulance company was attached to each division, but the ground was often of such a character as to render wheeled vehicles useless, and many of the wounded had to be carried long distances by hand. In the mountain country of what is now the Second district of the Department of Northern Luzon, where the trails are too rough and the turns too abrupt for the use of any kind of travois, the wounded had to be brought out into the foothills by hand litter. The labor of carrying a loaded litter speedily exhausted our men, so that recourse was had to Chinese litter bearers. These men, accustomed to carrying heavy burdens on their shoulder, proved exceedingly valuable under the supervision of the Hospital Corps. They were reported as being patient, tireless, and brave.

Light field hospitals or dressing stations accompanied the advance of the troops, and the wounded were sent back by ambulance or rail to the brigade hospitals or to the large hospitals in Manila. As the second division progressed northward during its campaign the line of rail was repaired. Cars were subsequently fitted up for hospital purposes, and now a daily hospital-train service has been established.

Favorable reports of the ability and zeal of the Hospital Corps on active service in the Philippines have been received from the medical officers on duty with the expeditionary columns. The sick and wounded have been intelligently, faithfully, and well cared for.

Even as late as January and February, 1900, an active campaign was carried on in southern Luzon. An expeditionary force of six regiments of infantry and two of cavalry was mobilized and divided into an advance column under Brigadier-General Schwan, and a marching column under Brigadier-General Wheaton. The brigade surgeon of the one was Maj. H. S. T. Harris, surgeon, United States Volunteers, of the other Maj. H. P. Birmingham, surgeon, United States Army. Another expedition was sent out later under Maj. Gen. James M. Bell for the suppression of insurrectionary movements in the Camarines. Maj. Thomas U. Raymond, surgeon, Fortieth Infantry Volunteers, was brigade surgeon of this command. The difficulties of caring for sick and wounded men on such campaigns may be gathered from the following reports:

Report of Maj. H. S. T. Harris, Brigade Surgeon, United States Volunteers, Chief Surgeon Second Division, Eighth Army Corps, Bautista, P. I., December 31, 1899.

I have the honor to submit the following report covering the period of my service in charge of this office:

When I reported for duty the headquarters were at San Fernando, and the front of the division occupied the following points, viz: Ninth and Thirty-sixth Infantry on the line from Bacalor to Guagua and the Twelfth and Seventeenth Infantry at Calulut and Sindalan. The sick were brought in from the Bacalor line by ambulances and from Calulut by railway transportation.

The ambulances were found to be insufficient in number and worn out from long and hard use. Constant effort has been made to obtain new vehicles and increase the train. My recommendations in this respect have been carried out as far as it was in the power of the Quartermaster's Department to do it.

The division field hospital, at that time at San Fernando, was taken charge of by First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, on August 20, 1899, and by his efforts has been kept in most excellent condition, and has met the heavy demands upon it in a most creditable manner.

The headquarters accompanied the advance to Angeles by way of Porac, September 28, 1899. The men wounded in taking Porac, 6 in number, were attended surgically by Maj. P. F. Straub, surgeon, Thirty-sixth United States Volunteer Infantry, and First Lieut. E. W. Pinkham, assistant surgeon, United States Army, surgeon Ninth United States Infantry, and were carried into Angeles with the column, after a night's rest at Porac, without any untoward results.

The division field hospital was moved to Angeles in the first days of October, and very advantageously located in the cathedral at that place, where it now is.

In the advance of Major O'Brien's battalion of the Seventeenth United States Infantry from Calulut to Magallang, November 7, 1899, provision was made for carriage by native bearers of the wounded along with the command, as the condition of the roads precluded the use of ambulances. Opportunity was found, however, to send in the 2 men seriously wounded at Angeles by bull-cart transportation. Acting Asst. Surg. R. A. Edmonston, United States Army, assistant surgeon Seventeenth United States Infantry, was slightly wounded while performing his duties under fire on this march. Hospital Steward George D. Douglass, Hospital Corps, United States Army, was seriously wounded while accompanying the other two battalions of the regiment from Angeles to Magallang on the same movement.

In the advance from Angeles to this place (Bautista), commencing November 9, 1899, the problem presented to the medical department has been quite difficult, owing to the fact that the final movement had to be organized from Mabalacat, 6 miles distant from the base, on short notice, and that the roads from Bamban on proved almost impassable. With the hearty cooperation of the medical-supply depot, the regimental surgeons, and the division quartermaster and commissary officers the task was accomplished without any more than the usual unavoidale amount of discomfort and privation to sick and wounded in the field. The number of wounded was fortunately in no measure what had been anticipated and provided for.

A temporary field hospital was established at Mabalacat for the reception of the wounded during the attack on Bamban November 11, 1899, and was moved to the latter place the next day, but owing to the condition of the roads it was left there temporarily. The sick of the regiments were satisfactorily cared for by their own medical officers at Capas and Murcia; but at Tarlac the personnel and supplies were brought up by rail and the hospital established in the church, under the very efficient charge of Acting Asst. Surg. J. S. White, United States Army. In order to entitle this hospital to the benefits of General Orders 137, Adjutant-General's Office, current series, it was, at my request, designated in orders from headquarters First Brigade, Second Division, Eighth Corps, as the First Brigade field hospital, although at that time taking care of the sick of all regiments at the front.

In the advance of the Thirty-sixth Infantry and O'Brien's battalion of the Seventeenth Infantry up the railroad medical supplies were carried by native bearers, as no transportation accompanied the command.

Since the establishment of permanent garrisons on this side of the Tarlac washout the sick have been cared for in the regimental hospitals of the Twelfth and Seventeenth Infantry, at Panique and Bautista, respectively. The Thirty-sixth Infantry has a hospital at Mangataren, but has been directed to send its more serious cases to the hospital of the Seventeenth Infantry, at Bautista. It is proposed to put on a well-equipped hospital car from Dagupan to Angeles and then to abandon the First Brigade field hospital at Tarlac and to cut down these regimental hospitals and have the sick cared for in the division field hospital.

The work of all the medical officers in the division has been so well done that it seems unfair to praise any by name. The Thirty-sixth Infantry, however, has been most active, and its surgeon, Maj. P. F. Straub, has had greater opportunity for exhibiting an intimate knowledge of the field requirements of a regiment and for independent executive work. Of these opportunities he appears to have made the best use possible. Both he and Capt. George W. Mathews, assistant surgeon, Thirty-sixth Infantry, have acquitted themselves gallantly on the many occasions they have been under fire. Capt. C. E. B. Flagg, assistant surgeon, United States Army, surgeon Seventeenth United States Infantry, accompanied the Seventeenth Infantry from Angeles to Magallang, Concepcion, and Capas, dressing the wounded in the many fights "right where they fell," to quote a line officer of the regiment, and doing good aseptic operation work under the most discouraging conditions. First Lieut. E. W. Pinkham, assistant surgeon, United States Army, surgeon Ninth Infantry, was with the firing line of the Ninth Infantry when Porac was taken, on September 28, 1899, and First Lieut. Clyde S. Ford, assistant surgeon, United States Army, at that time surgeon Twelfth Infantry, was at the front with the Twelfth Infantry in the capture of Angeles, on August 16, 1899.

The sick rate from all causes save malaria has remained practically stationary since August, 1899, but the number of cases suffering from that disease has trebled during November and December, with a steady increase during October. The type of malaria is not very pernicious, but tends to recur. No typhoid fever was noted at Angeles, but a few cases have recently occurred in three different regiments, showing, probably, a common source of infection encountered at some halting place on the recent advance.

The difference has been startling between the sick rate of regiments at the front doing constant outpost duty, subject to night attacks, and having to make periodical advances through difficult country, and that of regiments doing garrison duty at towns farther to the rear. This difference has been manifested even where the permanent stations have been in unsanitary locations. The post surgeon reports Candaba as badly drained and with bad surroundings, but the battalion there gave a sick rate of only 8 per cent, while the troops at Angeles, a comparatively well-drained town, with a sandy soil, gave a rate that was never less than 25 per cent. The troops at Candaba had been on ordinary garrison duty for some time, and those at Angeles had fought their way from San Fernando by successive attacks.

The sanitary regulations have been quite faithfully carried out by the troops. Great attention has been given to the boiling of the drinking water, but I do not believe that the men, even in established camps, can be made to avoid unboiled water entirely, and upon the march the enforcement of this order is impracticable. Authority was given the medical department to purchase quicklime for use in the sinks, but no lime can be found in this climate which is not air-slacked. Great as would be the expense, I should recommend that whenever practicable a sufficient quantity of chloride of lime be furnished to disinfect every sink at least once a day.

It is not in my province to either criticise or commend the administration of the medical department in these islands, but I wish to preface a recommendation with the statement that the organization, equipment, etc., are probably as nearly perfect as they can be made under the conditions which prevail. In my opinion each regiment should have four medical officers, one for each battalion, and a regimental surgeon, and the battalion organization should be further recognized by issuing three smaller sets of medical and surgical chests, each to be complete in essentials in itself, in addition to the large set now furnished for the regiment. I find that in the regiments the surgeons have been assigned to battalions and take sick call and care for them separately, and that this arrangement, for many reasons, works satisfactorily. A regimental surgeon is needed for purposes of general supervision and administration. The battalion in the new regimental formation is almost as much a unit as the regiment formerly was, and almost as large.

I recommended in a former report that a light spring wagon with two mules be assigned to each regimental medical department, and that six of these wagons be attached to the division ambulance train, to be used in carrying the medical and surgical equipment, so that it may always be ahead of the rest of the transportation and available. The recommendation was not carried out on account of the scarcity of mules, but should be put into effect as soon as possible, I believe, in cases where regiments are likely to have active service in a country where wheeled transportation can be used.

REPORT OF MAJ. H. S. T. HARRIS, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON OF GENERAL SCHWAN'S EXPEDITIONARY BRIGADE IN SOUTHERN LUZON.

The expedition was formed at San Pedro Macati in the early days of January. An ambulance train of seven vehicles with four mules each and civilian drivers was procured from the Quartermaster's Department. Fourteen Hospital Corps men and an acting steward were assigned to the train by the chief surgeon of the corps. As no transportation could be procured for extra drugs and dressings, one ambulance was loaded with a box of the essential drugs, anæsthetics, dressings, set of medical and surgical chests, and sterilizer; also some special food supplies for invalids.

The expedition consisted of the Thirtieth and Forty-sixth Infantry, nine troops of cavalry, battalion of Macabebe scouts, and several pieces of artillery. The command left San Pedro Macati January 4 and 5, camping in Muntinlupa the night of the 5th.

In taking Binan on the morning of the 6th 4 men were wounded. A field hospital was opened in the town and permanent dressings supplied by Surgeons McDill and Erwin, of the Thirtieth Infantry. On the same night the wounded were sent to Manila on the gunboat *Napindan*. Leaving a battalion of the Forty-sixth Infantry at Binan, the command marched southwest the next day to Silang, which place they occupied that night, the cavalry pushing on to Indang and Naic. They sustained a loss of 2 killed and 2 wounded in taking the towns of Indang, Silang, and Naic. The wounded were afterwards brought by boat from Naic to Manila.

The towns before mentioned having been garrisoned by the Forty-sixth Infantry, the remainder of the expedition started out again from Silang, January 13. The ambulances and wagon train proceeded by Binan and Calamba to Santo Tomas, the troops over mountain trails to Talosay, on the shore of Lake Taal, and thence to Santo Tomas.

The Thirty-eighth and Thirty-ninth Infantry joined the command at Lipa January 15. Four medical and surgical chests for detached service, which had been telegraphed for, were received from Calamba at this point and distributed among the battalions of the Thirty-eighth and Thirty-ninth Infantry. A battalion of the Thirty-ninth having been left at Santo Tomas and one at Lipa, with a small hospital at each place, the remainder of the command occupied Batangas without a casualty on January 16. Fresh supplies were here received from the hospital ship *Relief*.

Leaving a battalion of the Thirty-eighth Infantry to garrison Batangas and one to occupy Rosario, the command proceeded to San Pablo. Outside the latter place, at a point called San Diego, on the afternoon of January 20 the enemy was found intrenched and quite a hot little fight occurred, our loss being 8 wounded and 1 killed. Permanent dressings were applied to the wounded that night at the barrio of Pooc by Captain Erwin, assistant surgeon Thirtieth Infantry, and the writer. The wounded were carried forward with the command next morning.

At Lilio, at noon on January 21, information was received that the enemy was in force at the mountain town of Mayjayjay. The command marched upon this place, leaving orders for the wagon train and wounded to proceed to Santa Cruz. On the 22d the enemy evacuated Mayjayjay without waiting for our attack, and the command proceeded to Santa Cruz, leaving a garrison at Mayjayjay.

The wounded from the fight at San Diego were found at Santa Cruz under charge of Maj. F. A. Winter, surgeon, Thirty-seventh Infantry, and apparently in very good condition. They were shipped to Manila by the gunboat *Oeste* next day. I have since learned that two of the slightly wounded, a week or two after they had received their wounds, showed symptoms of infection from the bacillus ærogenes capsulatus and died. Such infection, I hear, is not uncommon in these islands.

The expedition was completed by a tour made by the commanding general and his staff through the provinces of Laguan and Tayabas, leaving Santa Cruz the 3d of February and returning the 7th.

The work of the Medical Department under the circumstances of the campaign was, I consider, satisfactory. The Thirtieth and Forty-sixth Infantry had been inspected previous to starting and their deficiencies supplied. The Thirty-eighth and Thirty-ninth, however, appeared to have started out rather unprepared and were wanting in both medical officers, hospital-corps men, and equipment.

The medical and surgical chest for detached service was found of the utmost value—small, compact, and complete for its purpose. It was found feasible to carry it with the command by Chinese bearers, and as the column practically never had its wagon transportation with it this proved a matter of the greatest importance. The sick and wounded of the command had to be left at each town which we garrisoned, it being both impossible and inadvisable to carry them farther with the column than was absolutely necessary. This scheme worked fairly well practically, and is about the only one which can be put into effect in such campaigns. The classical plan of a first-aid station on the field with ambulance station, brigade hospital, etc., does not apply to the small running fights of such warfare. The wounded must be dressed where they fall and the permanent dressings applied in the town attacked after it has been taken. All the officers of the medical department of the brigade gave most cordial cooperation and assistance on all occasions. Lieut. E. D. Sinks, assistant surgeon, Thirty-seventh Infantry, is particularly to be commended for gallantry in dressing the wounded under fire at San Diego. The ambulances taken from Manila and the hospital-corps men with them were distributed among the different stations garrisoned by the command as needed. All applications for supplies made upon the chief surgeon of the division were filled with the utmost promptitude. Eight men were killed and 27 wounded during the expedition.

ESTABLISHMENT OF GARRISONS.

The primary object of these campaigns and expeditions was to break up and disperse all organized resistance to the authority of the United States. When this was accomplished it was followed by the necessity of occupying all strategic points on the coast and in the interior to protect life and property during the unsettled condition of the country consequent on the dispersion of the insurrectos. The troops, instead of being massed by brigades, became scattered as garrisons in towns and villages. Even the companies of a battalion were not always stationed at the same post. This change in the character of the service required of the troops had an important bearing on the medical administration. The number of medical officers which had sufficed for field service when the troops were massed was wholly inadequate to furnish post surgeons to every post under the new and suddenly developed conditions. A scarcity of medical officers was specially marked in the case of the troops occupying the Camarines. Although the personnel of the medical and hospital corps assigned to duty with this brigade was considered by the chief surgeon to be sufficient to meet the exigencies of service, the splitting up of the brigade into a large number of small commands for the occupation of the country rendered it impossible for him to assign a medical officer to each of these detachments. (See report on page 151.) In another instance seven medical officers were assigned to duty with one regiment, yet some of the stations garrisoned by this regiment had to be left without a resident surgeon. As it was impossible to obtain a medical officer for every station, it became necessary to place selected men of the hospital corps at subposts and with small detachments to care for slight cases and call upon the surgeon of the nearest garrison when his assistance was required. In several instances a medical officer has been responsible for the care of three or four subposts or detachments, 5 to 15 miles apart, when, owing to the hostile condition of the country, an escort was necessary for his protection in making his visits to them. Similar conditions have frequently existed in our own Western Territories, or so-called Indian country, prior to the extension of railroads over them and their subsequent settlement and cultivation. To relieve the stress of this situation medical officers and acting assistant surgeons were sent out by every transport which sailed from the United States for Manila. On December 31, 1899, there were 257 medical officers in the Division of the Philippines. This number was considered sufficient by General Otis. On January 11, 1900, Colonel Greenleaf, chief surgeon, estimated the number of medical officers required at 360. His report of April 30 records the presence of 356 in his division, and his report of May 31, 364. From January 1 to June 30, 1900, 126 medical officers were sent to the Philippines.

This subject is explained in full in the following communication:

AUGUST 15, 1900.

SIR: Referring to recent cablegrams from Manila calling for 100 more medical officers for service in the Philippines, I have the honor to invite your attention to the following facts:

The return of Colonel Greenleaf, chief surgeon at Manila, for December 31, 1899, shows that the number of medical officers in the Philippines upon that date was: Regulars, 45; volunteer staff, 22; regimental, 63; contract surgeons, 127—a total of 257, or something over 4 per thousand of strength of the command, estimated at 60,000. Since that date the number of troops has not been increased, and a recent report shows that the health conditions have been quite favorable. The total number of sick during the first five months of the year 1900 has not at any time exceeded 9.65 per cent of the command, and has averaged 8.08 per cent. Colonel Greenleaf's predecessor (Colonel Woodhull) anticipated a much larger sick rate and represented the necessity of additional medical officers in view of the greatly increased amount of sickness which he anticipated. General Otis, however, as I am informed, did not consider more medical officers necessary at that time. He, however, at a later date, March 28, 1900, asked for 30 medical officers, "this because of numerous new stations established."

In a letter from Colonel Greenleaf dated January 11, 1900, he says:

"A similar difficulty presents itself in the matter of medical officers, of whom there is also an insufficient number for the current wants of the service. At least 75 more are required to complete the number necessary, in my opinion, for the medical service of the troops now in the islands, viz, three-fifths of 1 per cent of the aggregate force. There are now 285 medical officers here; there should be 360, estimating the present force at 60,000 men."

This letter was not received at my office until February 12. From February 1 to April 30, 77 medical officers were sent to the Philippines in compliance with this demand, and on April 30 Colonel Greenleaf's report showed the total number of medical officers in the Philippines to be within four of the number fixed in his letter of January 11, above referred to, viz: Regimental surgeons, 72; United States volunteers, 26; regulars, 47; contract surgeons, 211; total, 356.

On February 5 I cabled to Colonel Greenleaf as follows: "Ordered to Philippines since December 1: Commissioned, 8; contract, 28. Of these 22 have sailed." The following day he cabled to me: "In great need of 40 more." At this time his letter of January 11 had not been received, and it is evident that his cable of the 6th, following mine of the 5th, was a request for 40 more in addition to those who had already been ordered. During the months of February and March 44 were sent.

On March 12 Colonel Greenleaf cabled: "How many medical officers?" and I replied: "Sailed since February 1, 9; awaiting transportation, 30; contracts will be made with 20." On March 28 General Otis cabled, as above stated: "Still needed, 30 medical officers; this because of numerous new stations established." During the month of April this requisition was filled, 33 medical officers having been ordered during that month to the Philippines.

In a letter dated February 10 Colonel Greenleaf says: "I think you ought to know the exact truth of affairs here, and for this reason have written as plainly as possible, and also that you may thoroughly understand my reasons for asking for 40 more medical officers. Now that organized resistance on the part of the insurgents has practically ceased and military operations are confined largely to hunting down brigands, the desire for service in the Army is fading out, and it will not be long before many of the contract doctors now here will give up their contracts and ask to return to the United States. I think it would be wise to have a reserve force of from 25 to 50 medical men distributed throughout the islands who could be called upon to fill vacancies that will occur in the future through these causes."

This letter of February 10 is evidently in explanation of his cablegram of February 6, and simply confirms the request for 40 more, with the suggestion that it would be well to have from 25 to 50 in addition as a reserve force. At this time we had in service the full number of medical officers authorized by law, the act making appropriations for the support of the Army for the fiscal year ending June 30, 1900, having appropriated for 400 contract surgeons only; but in view of Colonel Greenleaf's statement in his letter of January 11, 1900, I requested the military committees of both Houses to make appropriation for the fiscal year ending June 30, 1901, for 480 contract surgeons. The appropriation was made, but with the limiting clause, "Not to exceed 480." Therefore, up to June 30, 1900, the limit fixed by law was 400 and after that date 480, a number which I supposed at the time the estimates were made would be ample, a supposition which was justified by Colonel Greenleaf's estimate above referred to; that is, for the Philippines a total of 360 medical officers.

In a letter dated March 15 and received at this office April 19 Colonel Greenleaf says:

"Since my last letter to you about twenty new posts have been established, some of them on the seacoast and some in the interior. Many of them are yet without medical officers, and I was very much gratified to receive your cable message announcing that I might count upon 59 doctors within the next two months."

In a letter dated May 15 Colonel Greenleaf says:

"I desire to add that there should be kept up a constant stream of medical officers to this division to take the places of those returning. There is already a list of 22 acting assistant surgeons who have applied for annulment of contract, but the general conditions have been such that I have been compelled to hold them as a military necessity. This has created much dissatisfaction, and, as you will observe in a letter going by this mail, one of them has deserted. There should be from 5 to 10 medical officers sent out on every steamer leaving the United States until our medical needs are fully met, at which time I can easily cable you and the supply can cease."

This constant stream of from 5 to 10 medical officers it has been my aim to maintain. Sixteen contract surgeons were ordered to the Philippines during the month of May and 19 during the month of June. In all, 126 medical officers were ordered during the six months ending June 30, and I had reason to believe upon this date that I had met as promptly as was practicable the demands for medical officers which had been made by the general commanding the Division of the Philippines and by his chief surgeon. But, upon July 14, during my absence from the city on an inspecting trip, a cablegram was received from Colonel Greenleaf as follows:

"Need 100 medical officers, 300 Hospital Corps, Philippine Islands."

In a letter from Colonel Greenleaf dated June 7 he says: "There is a deficit of 120 medical officers in the Philippines, but I think 75 men could be made to supply the present deficit of 120, and thereafter regular detachments of 10 each month should be sent here, to meet the pending resignations and casualties, as heretofore recommended." This letter was received at my office July 19, during my absence on an inspecting trip. Colonel Greenleaf's cablegram of July 14 was forwarded to me at San Francisco, and I immediately instructed the Acting Surgeon-General to make contracts at once with 10 physicians who, having passed a satisfactory examination, were available, and to order the immediate examination of all desirable applicants. Upon my return to Washington, July 23, I immediately brought the matter to the attention of the honorable the Secretary of War and represented to him that it was impossible to supply the demand for medical officers in the Philippines and in China without exceeding the limit of 480 contract surgeons fixed by the act making appropriations for the fiscal year ending June 30, 1901. On July 27 I received the following order from the Secretary of War, and immediately announced through the public press that 100 more contract surgeons were wanted:

War Department, Adjutant-General's Office,
Washington, July 27, 1900.

The Surgeon-General United States Army.

Sir: Referring to your letter of the 26th instant regarding the representation of Colonel Greenleaf, chief surgeon of the Division of the Philippines, that more medical officers are greatly needed in that division, and to your expressed opinion that to meet the requirements in Manila and in China it will be necessary to employ under contract more than 100 additional physicians, etc., the Secretary of War directs that as many medical officers of the Medical Department as can be spared to meet the requirements of General MacArthur in the Philippines be sent there, and authorizes the employment of a sufficient number of contract surgeons to make up such deficiency in the number required to meet the present emergency, after such medical officers of the Army and contract surgeons now in service as can be spared from other points are ordered on this duty.

Very respectfully,

H. C. CORBIN, *Adjutant-General.*

More than 1,500 applications were received, and from among those who first applied I selected more than 150 who were authorized to present themselves to medical boards for examination as to their physical and professional qualifications for foreign service.

GEO. M. STERNBERG, *Surgeon-General.*

The SECRETARY OF WAR.

Those who passed a successful examination were at once ordered to San Francisco to be sent by the first available transport to the Philippines or to China. Eighteen sailed in the month of July, 83 in the month of August, and 41 in the month of September. In addition to this, 16 commissioned medical officers have been sent since July 1. In compliance with recent orders all of the medical officers who accompanied troops to China will go to the Philippines, except such as are required for duty with the legation guard of 1,500 men.

Most of the towns or pueblos occupied by our troops had roomy convents or churches, which were used as quarters for the commands, the friars having left the country during the insurrection. Private residences also were utilized as barracks, and, as a rule, the troops were well and comfortably housed.

Hospitals were immediately organized in these garrisoned towns—well-equipped establishments in those which were the headquarters of regiments, post hospitals in those having smaller garrisons, and dispensaries at places occupied by subposts or detachments. In addition to these local hospitals, base hospitals were organized at points on the seacoast or on rivers which had the best communication with interior stations. Thus, in the Department of Southern Luzon base hospitals were established at Calamba and Santa Cruz on the Laguna, and at Bacoor, Batangas, and Lucena on the seacoast. So in the other departments. Light cases remained in quarters at the subposts and minor garrisons; cases of greater gravity were transferred to the regimental hospitals; chronic cases were sent for treatment to the base hospitals, and these establishments when overcrowded were relieved by sending selected cases by the railroad, or from seacoast stations by the hospital ship *Relief*, to the larger hospitals in Manila. Colonel Greenleaf, chief surgeon, on February 10, 1900, gave the following tabulation of the hospital accommodation in the Division of the Philippines:

Manila:		
First reserve	791	
Second reserve	323	
Hospital No. 3	263	
Santa Mesa	600	
Convalescent, Corregidor Island	220	
		2,197
Hospital ships:		
Relief	234	
Missouri	300	
		534
First division:		
Base hospital, Calamba	100	
Second Brigade, Bacoor	120	

First division—Continued.		
Field hospital, Santa Cruz	60	
Field hospital, Naic, Cavite	40	
Tayabas	30	
Santo Tomas	50	
Batangas	50	
		450
Second Division:		
Field hospital, Angeles	180	
Base hospital, Dagupan	350	
Branch brigade hospital, Cabanatuan	60	
Field hospital, San Miguel de Mayumo	30	
		620
Visayan military district:		
Brigade hospital, Iloilo	300	
Post hospital, Cebu	150	
		450
District northwestern Luzon:		
Brigade hospital, Vigan	60	
Bangar	25	
Candon	25	
Narbacan	10	
Laoag	30	
San Fernando	30	
		180
District Mindanao and Jolo:		
Zamboango	30	
Jolo	30	
		60
Aparri		50
Regimental hospitals		750
Total		5,291

The establishment of post and regimental hospitals was of great benefit in relieving the base hospitals and those in Manila, for prior to this time all men taken on sick report had been sent away from their commands to these hospitals. Men who might have been returned to duty after a rest of a few days with special diet were sent to district hospitals, where their retention for want of facilities for their return to their command in many instances increased the numerical percentage of sick.

The distance of some of the posts from lines of transportation and the difficulties presented by mountain roads occasioned for a time a scarcity not only of medical supplies but even a shortage of rations. According to the chief surgeon all posts in Nueva Viscaya were temporarily on short rations. Fresh beef and potatoes were scarce and seldom issued up to April 20, 1900.

Many of the interior garrisons are cut off from communication with their base by the impassability of the roads during the rainy season. Care, however, has been taken to provide them in time with a full six months' supply of medicines and medical and hospital stores.

MUNICIPAL SANITATION.

The sanitary condition of the garrisoned towns and villages is described as having been execrable. Filth of all kinds underlay and surrounded the houses, and the hogs were the only scavengers. For the protection of their commands in such localities post commanders were required to consult with the local authorities with a view to remedy these conditions, and a great reformation in this respect was speedily effected. There appears no doubt that the sanitary condition of the garrisoned towns has been greatly improved since the advent of the American troops. In Manila the board of health, consisting of army medical officers, has done excellent work during the past year under the presidency of Maj. Guy L. Edie, surgeon, United States Volunteers, whose report is submitted below, page 213. To suppress the spread of smallpox among the native population vaccine matter, prepared under the supervision of this board, was sent to medical officers in the various military districts, and arrangements were made for a systematic vaccination of the people. See the report of Chief Surgeon Maus, Department of Northern Luzon (infra page 116).

The following letter from Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, chief surgeon Division of the Philippines, in relation to the sanitation of Manila and other large cities in the islands, was addressed to the adjutant-general of the division May 21, 1900:

I have the honor to submit herewith memorandum recommendations on municipal sanitation, for the present application to the city of Manila and to other large cities in the archipelago. It is proper to remark that maritime sanitation, including quarantine, is in the hands of the Marine-Hospital Service, which has its representatives on duty in Manila now engaged in equipping a plant at the quarantine station at Marivales.

Municipal sanitation.—This is now, and has been since the occupation of Manila by our troops, in the hands of a board of health, consisting of army medical officers. This board has done, under most trying circumstances, excellent and efficient service, so far as it has been able with the limited means at its disposal, but it has been hampered by lack of funds, and, owing to the unsettled condition of civil affairs, by the absence of a municipal administrative force that is essential to complete success; nor has it received the encouraging assistance from the late general commanding which the importance of the subject in its bearing on the troops demanded. It has made great progress in cleaning the streets of the city, in removing filth that has been accumulating for years, and in regulating, to a certain extent, the purity of the food supply; it has practically stamped out smallpox by forcible vaccination and revaccination, where that was necessary, and has held in check the progress of bubonic plague, that, after lodgment in other tropical cities, has speedily become epidemic and caused a frightful mortality; but its work has of necessity been superficial, and the good results can only be maintained by a constant vigilance, by a vigorous support from the military authorities, and by a liberal supply of funds. The Spanish laws on sanitation are in most instances well drawn, but they have not been properly executed, and the American additions, while equally good in theory, have been almost as faulty in execution. This is practically the case in overcrowding of habitations, due to the rapacity of the house owners, who, in their eagerness for gain, disregard all law, and fill their tenements to the utmost capacity of the rooms. It is to secure these important aids that the inclosed memorandum is submitted. The work to be done is an immediate and pressing necessity, but should not obscure the greater necessity for a permanent sanitary organization. So soon as municipal government is organized there should be appointed a capable sanitary engineer, a superintendent of public buildings and works, and a board of health, to decide upon and formulate methods for disposing of excreta, garbage, street waste, etc., whether by water carriage (sewerage), cremation, sea dumping, or otherwise; for securing a pure food supply, including inspection of meats, vegetables, fruits, etc.; the construction and care of markets; for improving the water supply, increasing its quantity, and insuring its purity; for cleaning the "esteros," constructing tide gates, and walling their banks with masonry or concrete, so that they will not only carry off the surface drainage, but will serve as highways for commerce through various parts of the city; and for the adoption of general health regulations, such as are now in force in any larger American cities.

1. A strict enforcement of existing rules, both municipal and military, regarding cleanliness about habitations, the emptying of privy vaults, dry-earth closets, and cesspools, and the flushing of drains and sewers. In the nipa house districts, an insistence upon the use of dry-earth closets by the occupants; in the markets, cleanliness to be enforced and no person to be permitted to live in them, and for this purpose that a market inspector be appointed for each market, who shall be present from

its opening to its close, and make prompt report to the board of health of any disobedience of the rules.

2. A strict compliance with existing laws, and such alterations therein as in the judgment of the board of health will best conserve the public health.

3. The prevention of overcrowding in habitations, by the promulgation of an ordinance making every house owner amenable to a fine or imprisonment, or both, if more persons than specified according to surface (18 square feet) and cubic air space (not less than 300 cubic feet) are permitted to live in their houses.

4. The removal, where practicable, of persons from premises that are now overcrowded.

5. To give effect to these matters, the appointment of a building superintendent to act as special inspector over that subject; the enforcement of a strict compliance with the rules governing the issuance of licenses to build and occupy habitations, and if necessary an increase in the number of sanitary inspectors to insure efficiency in house, lot, and street cleaning, and the removal of garbage and ashes. When house owners fail after due notice to clean their premises, the board of health to have it done, charging the cost against the owner.

6. For the removal of night soil, a sufficient number of large scows to be provided that can be towed into the bay and emptied at a place not nearer the city than Cavite Point, and as much farther from there as will insure the deposit from being returned by ocean currents to the vicinity of the city; street sweepings, garbage, and under certain conditions portions of night soil, to be cremated as at present, and when approved by the board of health, disposed of to surrounding farms.

7. During the wet season, the moat around the walled city and all "esteros" in the city limits to be dredged and thoroughly cleaned.

8. For the prevention and care of infectious diseases: (*a*) A continuance of the present system of house-to-house inspection, the segregation of suspects or developed cases, the quarantine of the house and its inmates during the incubation period of the disease, the thorough cleansing and disinfection of the premises and the occupants' effects, and the destruction, so far as practicable, of vermin. (*b*) The construction of a temporary (nipa) infectious-disease hospital, to take the place in site and bed capacity of the present tent hospital, which, during the rainy season, will be unsuited to its purpose.

9. The promulgation of an ordinance requiring compulsory vaccination of all unprotected inhabitants, and that after the opening of the schools no one shall be admitted as a pupil except on presentation of a certificate of recent vaccination or revaccination.

10. That the interpretation and enforcement of laws governing municipal sanitation be under direction of the board of health.

A communication on the subject of leprosy was addressed to the military governor by the chief surgeon June 4, 1900, in which he represented the number of lepers in the archipelago to be about 30,000, and urged the advisability of taking immediate steps to protect the healthy population from future infection. He submitted a "projet" for the segregation and care of lepers in the islands. The plan, which was drawn up with the assistance of Major Edie, president of the board of health, and Maj. L. M. Maus, surgeon, United States Army, both of whom had given much study to the subject, was as follows:

As a large number of the people in these islands are the subjects of leprosy, and their presence has become a menace to the safety of the healthy population, it is recommended:

1. That there be set apart any land or portion of land now owned by the government for a site or sites of an establishment or establishments to secure the isolation and seclusion of such leprous persons as in the opinion of the board of health or its agents may, by being at large, cause the spread of the disease, and that the government acquire for this purpose, by purchase, exchange, or condemnation, any pieces or parcels of land which may seem better adapted to the use of lepers than any land owned by the government.

2. That a board of public health for the archipelago be organized without delay, with full authority to deal with all questions affecting the public health and sanitation of the islands, and to appoint the necessary agents to carry out its work.

3. That a board of officers, consisting of one medical officer, one quartermaster, and one judge-advocate, be detailed to select one or more suitable islands, and to prepare plans and estimates for buildings, submit an estimate of salaries for the necessary offi-

cials, etc., and fix the rations and other allowances necessary for the support of the lepers and the colony. A list of the islands that is thought to be suitable for the purpose is herewith submitted.

4. That the board of health or its agents be authorized and empowered to cause to be isolated and confined on the island selected, all leprous persons who shall be deemed capable of spreading the disease; and it shall be the duty of every police and district authority, when properly applied to for that purpose by the board of health, or its authorized agents, to cause to be arrested and delivered to the board of health, or its agents, any person alleged to be a leper within the jurisdiction of such police or district authority; and it shall be the duty of police officers and others of like authority to assist in securing the conveyance of any person so arrested to such place as the board of health or its agents may direct, in order that such persons may be subjected to medical inspection; and thereafter to assist in removing such persons to the place of isolation, if so required by the agents of the board of health, and that the following memorandum regulations to facilitate the segregation of lepers be adopted.

5. Whoever shall knowingly detain or harbor on premises subject to his control, or shall in any manner conceal or assist in concealing, any persons afflicted with leprosy, with the intent that such person be not discovered by or delivered to the board of health or its agents, or who shall support or assist in supporting any person having leprosy living in concealment, shall be deemed guilty of a misdemeanor, and shall, upon lawful conviction thereof before any court, be liable to a fine of not more than $100.

6. It shall be the duty of every officer or deputy having reason to believe that any person within his district is afflicted with leprosy to report the same forthwith to the agents of the board of health within such district, if any; otherwise to the nearest agent of the board. Any police officer who shall wilfully fail to comply with this provision shall be deemed guilty of a misdemeanor, and, upon conviction thereof before any police or district court, shall be fined in a sum not less than ——— nor more than ——— dollars, and shall be dismissed from office.

7. The board of health is authorized to make arrangements for the establishment of hospitals in the islands where leprous persons, in the incipient stages, may be treated in order to attempt a cure; and the said board and its agents shall have full power to discharge all such cases as it shall deem cured.

8. The board of health, or its agents, may require from patients such reasonable amount of labor as may be approved by the attending physicians; and may further make and publish such rules and regulations as by the said board may be considered adapted to ameliorate the condition of lepers.

9. No person not being a leper shall be allowed to visit or remain upon any land, place, or inclosure set apart for the isolation and confinement of lepers without the written permission of the president of the board or some officer authorized thereto by the board of health, under any circumstances whatever; and any person found upon such land, place, or inclosure without a written permission shall, upon conviction thereof before any police or district court, be fined in a sum not less than ——— nor more than ——— dollars for such offense, and in default of payment to be imprisoned at hard labor until the fine and costs of court are discharged in due course of law.

10. It shall be lawful for the board of health, through its president, to make and promulgate such rules and regulations as may be from time to time necessary for the government and control of the lepers placed under its charge, and such rules and regulations shall have the same force and effect as a statute law, provided always that they be approved by the proper authority and that they be published in two newspapers published in Manila.

11. Rules and regulations for lepers and attendants living at the leper settlement in reference to leaving the settlement, general sanitation and personal hygiene, building of houses, raising of animals, cultivating of lands, etc., will be made by the board of health in accordance with preceding section.

General remarks.—It is expected that many of the lepers or their friends will build their own houses, as a number of them are fairly well to do.

As the question of leprosy is one that will have to be reckoned with by the inhabitants of these islands for the next one hundred years, it is especially important that the best site be selected and the right beginning be made; and for this reason the appointment of a board which will carefully investigate and study this subject has been so persistently asked for. The former military governor approved the suggestions made on this subject by the Manila board of health and decided to appoint a board of three officers to investigate and formulate a working plan for the isolation of lepers as soon as the conditions in the islands permitted. This paper gives the general plan of handling this subject, and in some points has gone into detail of the legislation needed.

One of the points on which legislation is needed is the prohibition of the carrying of lepers by the masters of the interisland coasting boats without a proper permit, and compelling these same masters to carry lepers upon an order of the board of health.

Suitable islands for lepers.—Lutbang and Golo; about 60 miles from Manilia. They are very rich and poorly populated. These are the most suitable islands.

Polillo; north of Luzon, very large, and could contain very well 30,000 inhabitants.

Batag; beautiful and healthy place; is a few miles from Samar, but could easily be guarded by a small gunboat.

Besides these islands, Dr. Manuel Rogel y Lebres recommends: Jau, in Bohol; Clango, in Cebu; Apo or Refugio, in Negros; an island near Guimaras, in Panay; Limasand, in Leyte; Buad, in Samar; Simara, in Romblon.

The following reports from chief surgeons and other medical officers on duty in the Philippine Islands give interesting details of their service and of the medical and sanitary conditions affecting their commands.

Report of Col. Charles R. Greenleaf, Assistant Surgeon-General, United States Army, Chief Surgeon Division of the Philippines.

Headquarters Division of the Philippines,
Office of the Chief Surgeon,
Manila, P. I., July 13, 1900.

The Surgeon-General United States Army.
(Through Military Channels.)

Sir: I have the honor to submit herewith a report of the operations of the medical department in the Division of the Philippines for the six months ending June 30, 1900. Detailed reports from chief surgeons and medical officers commanding hospitals accompany this report, and I have to request that selections be made from them for publication in their entirety in the annual report of the Surgeon-General.

Health.—The health of the army has been good, the sick report from all causes not exceeding 9.6 per cent of the total strength in any one month, the average for the six months being 8.8 per cent. The aggregate numerical sick report by months is herewith given:

Date.	Total strength.	Effective strength.	Ineffective strength.	
			Number.	Per cent.
December, 1899	57,175	52,040	5,135	8.9
January, 1900	63,423	57,833	5,590	8.81
February, 1900	65,936	60,661	5.275	7.9
March, 1900	63,441	57,857	5,584	8.79
April, 1900	62,934	57,255	5,679	9.02
May, 1900	63,484	57,359	6,125	9.65
Average				8.845

The principal diseases were intestinal and malarial, the former showing 35.1 per cent and the latter 23.1 per cent to the whole number of cases. Of wounds and injuries there were 10.6 per cent and of venereal diseases 9.3 per cent. Preventable diseases give a percentage of 44.8 to the whole number.

The total number of deaths from all causes was 826, namely:

	Officers.	Enlisted men.
Killed in action	4	174
Died of wounds	3	40
Accidental deaths		22
Drowned	2	33
Suicides	3	15
Disease	8	522
Total	20	806

Total wounded—26 officers, 348 enlisted men.

There were sent to the United States:

	Regulars.	Volunteers.
Invalided on account of chronic disease	507	379
Insane	60	41
For discharge on surgeon's certificate	144	102
Total sent to the United States	711	522

The relatively small percentage of sick in this army is, in my opinion, largely due to the care and attention given by officers and men to sanitation. An increased appreciation on their part of its beneficial result to health, and consequent increased efforts to carry out its rules with thoroughness, will result in a further diminution of the sick report. Roughly stated, one-half of the sickness in the army could have been prevented if everybody had obeyed the sanitary recommendations of the medical officers. The conditions of army life during the past six months have been much better than at any other period, since the troops have been able to sleep under shelter a great part of the time, and have opportunities to properly prepare their food, to sterilize the drinking water, and to give attention to cleanliness of clothing and person, and, above all, they have not during this period, when actively engaged in the field, been constantly exposed in the trenches and on the march to rain without opportunity to wear dry clothing or to sleep in a dry place. There is much significance in the fact that the smallest percentage of sick is shown in the February report, which covers the period of greatest military activity during the six months, viz, General Schwan's campaign in southern Luzon with over 20,000 men, the occupancy of many places in the southern islands, and the constant "hikes" by General MacArthur's men after ladrones and insurrectos in northern Luzon. These operations were conducted during the dry season, rains being exceptional. Although the heat during the middle of the day was excessive and the men were undergoing great physical exertion, the percentage of cases of heat exhaustion and sunstroke was only a trifle more than one-third of 1 per cent (0.38) to the whole number of sick.

Much has been said and written about the food of the soldier in the Tropics, and the composition of the regular ration has been criticised as being improper, in containing too much meat and too little starch. It has been alleged that the soldier should be fed somewhat after the manner of the native, largely on rice and other cereals and starchy foods, and the quantity of his meat (beef and bacon) diminished. However sound these views may be as scientific theories they are not supported by the results of practical experience. The soldier craves and gets, some way or other, the food he has been accustomed to eat at home, and he eats plenty of it. He wants meat twice or thrice a day, and he eats bacon or uses it in some form or other in his cooking whenever he can get it. He will not eat rice. He has a strong desire for sugar, and the addition of candy to the sales stores has been a great blessing to him. It does not appear, after careful observation, that the food furnished the soldier by the present ration produces sickness either by its variety, character, or quantity, provided it is properly cooked and is eaten in moderation. If the provisions of an act of Congress approved March 3, 1899, to allow the purchase of extra articles of diet for men in camp when serving in "debilitating climates," were reenacted and enforced, the soldier serving in the Tropics would have everything that could be desired in the way of a nutritive and health-giving dietary, since under the provisions of this act he may buy fresh vegetables and occasionally change the character of his meat diet by buying poultry, fresh fish, eggs, etc. It is to be regretted that advantage was not taken of this wise provision for varying the diet of the men in the Philippines, whose physical comfort could have been much improved by this means.

It has been found that the intestinal disorders of the Tropics are mostly due to specific germs and only in exceptional cases are induced by errors in diet. So far as we know the water of this country is their carrier, and when this is sterilized the main factor in the production and propagation of this class of disease is eliminated. The board of officers now studying tropical diseases has been of great assistance in investigating outbreaks of dysenteries and diarrheas, and their demonstrations to commanding officers have done a great deal toward convincing them of the necessity for care in this direction.

Nearly all of the diseases of the Tropics produce an effect on the general economy that does not follow similar diseases in the temperate regions, and that is a lowering of the vital force to such a degree that full recovery of health becomes impossible so long as the patient is in the tropical climate, and doubtful even after his return to and residence in a temperate climate. The marked increase in the number of regular soldiers over volunteers who have been invalided to the United States and discharged for disability is, I think, due to the baneful influence of the Cuban and Porto Rican climate on the regular soldiers who had not a sufficiently long residence in the United States before coming to the Philippines to fully recuperate from its effects, and therefore speedily succumbed to the new influences of this climate, from which recovery for them was impossible. Apparently the only disease from which complete recovery may be expected by residence at any of the sanitary points in the islands is malaria, but after such recovery reinfection frequently follows exposure. Tuberculosis is rapidly fatal, rheumatism becomes chronic, and I think that even the hot springs of the country, which have a great repute among natives for its cure, will not be effective with Americans. Diarrheas and dysenteries when chronic are incurable here; hence it is evident that there will be a constant stream of invalid patients from these islands to the United States, for the care and disposition of which an organized, well-digested system is desirable. As no report has been made to me regarding the results of transfers to the United States, I am unable to give any other information on the subject than what comes before me here. Regarding the insane, but little can be said, as there is no expert alienist on the islands[1] to examine into their cases and determine their character, nor is there any proper place here where they can be kept for observation. No other course is open, therefore, than to transfer to the United States all cases that, after such study as can be given, are believed to be genuine. Homesickness is a potent factor in producing the condition of melancholia into which many of the cases have passed. The isolation of the troops, their lack of knowledge of the native language, their enforced confinement to the towns they garrison, and the constant nervous strain incident to continued preparation against attack by the enemy combine to produce the mental condition which, for want of a better name, is called "insanity," and which is often completely and effectively cured by the journey to the United States. That this condition is a serious one is evidenced by the fact that the majority of suicides occur in this class of cases.

The health conditions among the natives have been carefully considered and attention is invited to my report (herewith attached) to the division commander, regarding municipal sanitation and the care of lepers; also to the report of Major Edie, president of the board of health of Manila. The division commander has taken a deep interest in these matters and by his direction measures are actively in progress toward carrying out the recommendations that have been made.

Hospitals.—The general principle followed in the management of hospitals has been their establishment in regiments for emergency purposes only, from which those who are very sick may be sent to field hospitals that are equipped to care for such cases, these in turn being evacuated into base hospitals, located at points convenient to rail or water transportation, from whence cases requiring it may be transferred to the United States directly or via Manila. These and the larger hospitals at Manila are equipped with the most complete material available. All have special diet kitchens and operating rooms, and nearly all have pathological laboratories, while the personnel of the Manila hospitals and several in the provinces includes a corps of trained female nurses. One of the hospitals at Manila serves as a general depot for the reception and distribution of cases arriving by water transportation and of those requiring the services of specialists, either for surgical, medical, or diagnostic purposes, its staff including men specially trained in these branches. It has a complete pathological laboratory, in which the board of medical officers who are studying tropical diseases carries on that part of its work. Here also the army medical board holds its sessions. Infectious diseases are treated in separate and isolated wards and the general morgue is located near it. An emergency hospital, under the direct control of this office, has been established and equipped near the dock of the captain of the port, in Manila, to receive and care for, temporarily, patients who arrive on vessels from various parts of the archipelago, in which provision is also made for accident and other emergency cases in the city and from the railway.

The cases for transfer to the United States as invalided are selected by a board of three medical officers in each of the Manila hospitals, who carefully examine the men and recommend only those who have been long ill and whose lives will not be jeopardized by the sea voyage. The cases usually selected are tuberculosis, chronic dysentery, diarrhea, chronic malarial poisoning, rheumatism, and the insane. As previously stated, what the results of the transfers are I am unable to say, as no report on that subject has been sent me from the United States. Several reports have, however, been made regarding intestinal cases returned to duty in these islands from the United States, to the effect that there was a speedy return of the disease, with consequent readmission to hospital. This subject demands careful study, for which time and experience is needed. A similar study should be given to the subject of establishing sanitaria for troops that are worn out by field service and its consequent exposures. It is said that the Spaniards had selected sites in the uplands of the island of Luzon for the construction of barracks for this purpose, but I have not seen their reports. So far our experience is against such a procedure, since the most virulent forms of malarial poisoning have been found among troops sent into the elevated valleys for station, or among those who have campaigned in the mountains. The lowlands appear to be the most healthful parts of the islands for Americans. This subject is now under investigation.

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[1] At the time this report was written an expert was en route to Manila, P. I., to undertake these duties.

There has been but little done in the construction of hospitals, partly because the most desirable points for their location are not yet known, and partly because of the high price of lumber, due to an alleged "combine" among dealers. Two wards of nipa have been built at the Santa Mesa Hospital, at Manila, which increases the capacity of that hospital to 1,000 beds. The construction of additional buildings for 250 beds at the hospital at Corregidor Island was authorized, but the work was suspended on account of the price of lumber. Recommendation will be made to build a new hospital at Iloilo, and to enlarge the hospital at Dagupan, and extensive repairs will be made on other buildings now used as hospitals throughout the archipelago.

Medical personnel.—The administration of the department has been much embarrassed by the scarcity of its personnel. On my arrival the hospitals were undermanned, medical officers being obliged to attend an average of over 100 patients each, and a great many military organizations were without medical care. There were frequent instances of contact with the enemy where wounded men were without any other surgical assistance than that which their comrades could give them. As the troops advanced and were separated from each other to garrison towns, this scarcity increased; frequent requests were made by my predecessor for additional medical officers without avail, and I repeated them, but it was not until the month of March that relief came in the arrival of a small detachment of medical officers from the States, which was followed by others at a later period; the term of service of many contract doctors had meanwhile expired and a great many demanded to be sent home; the division commander approved my recommendation to hold to service, as a military necessity, as many as were absolutely necessary to care for the sick until further relief should arrive, and this is now being done. I have to record the fact that one, Dr. Atkinson, was base enough to desert the service, leaving the sick intrusted to his charge without medical assistance, and taking passage on a commercial steamer to his home in Massachusetts. There are now 120 stations occupied by troops without medical officers; at some of them members of the Hospital Corps perform the medical duty as best they can, at others there is no medical assistance. Many medical officers are obliged to attend from 3 to 5 stations, visiting them at great personal risk, since the country is infested with ladrones and insurgents, and it is not always possible to obtain proper escorts; they deserve the highest praise for their devotion to duty and their heroism.[1] In view of the uncertainty of the tenure of office of contract surgeons, I recommend legislation by which they may be commissioned and given such military status as will insure their continuance in service for the same term and under similar conditions as are required of volunteer officers.

The hospital corps also has been undermanned, and recourse has been had to the employment of natives and Chinese to meet the deficit, who have done satisfactory work, and indeed there is much duty, such as policing, the sanitary service, etc., that can be done only by them. I recommend that authority be given to employ or enlist a certain number of them for permanent service with the medical department in the Tropics.

In view of the large number of men of the Hospital Corps who were found to be unfamiliar with their duties, a system of instruction was organized at Hospital No. 3, Manila, for the purpose of teaching the men who were gathered at that station after arrival from the United States and awaiting assignment, such of their elementary duties as was possible in that limited time. The experiment was successful, and the division commander (General MacArthur) authorized by general orders the establishment of a company of instruction, which was fully organized and placed in operation by Major (then Captain) Kulp, and is now in successful operation. The first class of 43 members was graduated on June 15, 1900, in the presence of the general commanding, with appropriate ceremonies.

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[1] See remarks on page 120.

The female nurses have done excellent service. Up to the time of my arrival there was none on duty outside of Manila, but since the islands have been fully occupied by troops they have been sent in small detachments to the larger hospitals in the several military departments, and the field for their service has been accordingly largely extended. Their influence on the sick and on the well has been a good one, and they have, as a rule, been discreet in conduct, amenable to discipline, and possessed of professional ability of a high order.

In hospitals where the nursing is done by females members of the Hospital Corps have but little opportunity for practical clinical instruction or work, their service being almost exclusively given to the police of the wards. For this reason I am of the opinion that where it is deemed advisable to employ female nurses there should not be any hospital corps men for ward duty, the nursing being done exclusively by the female nurses, and that natives should be employed for the ordinary police service. The nurses' ration is insufficient, especially in regard to the night lunch, unless there is a large number of them on duty in the hospital, and I recommend that authority be obtained to permit them to be subsisted from what is known as the 40 cents per day allowance. In fact, the efficiency of the diet department in hospitals would be much increased by extending the authority to use the allowance for the entire personnel, since the present system involves the constant use of two kitchens and separate subsistence accounts for the sick and their attendants, which are seldom correctly kept.

Sanitation.—Experience has taught a majority of the troops the necessity for a strict compliance with the more important regulations for preserving health. As a rule camps and quarters are properly policed, care is taken in the disposal of excreta, boiled water is almost universally used, and attention is paid to the proper cooking of food. Line officers join with medical officers in efforts to maintain a proper condition of cleanliness of the habitations and the persons of the troops. The dry-earth system is used in the majority of stations, excreta being removed by native labor. Where the pit system is necessary the contents are sterilized by fire, coal oil being used as fuel, and in Manila the odorless excavators are used. The Waterhouse-Forbes sterilizer has been of the greatest benefit, and it is hoped that before long every company in the army will be supplied with one. Numerous instances of individual infection by typhoid fever, which is endemic in the islands, have occurred, but there has been no serious extension of the disease among the troops, the sanitary precautions that have been taken having proved sufficient to check it at once. Medical officers are instructed to use the same precautions on the occurrence of a case of typhoid fever that they would with smallpox, viz, isolation of the case and disinfection of all excreta, personal belongings, quarters, and sinks; segregation of suspects, and vigilance in watching the noninfected members of the command. In two instances local epidemics assumed rather alarming proportions before the nature of the disease was recognized—one in a detachment of the Forty-second Infantry at Paete and the other in the Thirty-ninth Infantry at San Pablo, both on Laguna de Bay. Prompt measures were taken along the lines above mentioned. The sick were removed to Manila hospitals, suspects placed in detention camps, thorough cleansing of the towns and quarters, with subsequent disinfection, etc., and the spread of the disease was promptly and completely checked. In Manila the work of the board of health, under the able management of Major Edie, has been very effective. The city has been cleaned, and is kept as clean as conditions will permit; systematic inspections of the food supply are made, the markets are kept in order, and the sick poor cared for. Special attention has been given to the work of checking the advance of bubonic plague, which made its appearance in January. So far there has been no extension of the disease, sporadic cases alone having occurred. Arrangements are now being made to dispose of the leper population of the islands, which is estimated at about 30,000 in number. A projet has been approved by the division commander for their segregation on an island where they can be properly cared for, and under intelligent direction and supervision be made self-supporting. A board of officers is now examining several islands with a view of selecting one that will be suitable for the purpose, after which the measures now formulated for gathering them and establishing the colony will be carried out. A system under which the native population should be vaccinated was instituted by Major Maus in northern Luzon and extended to all the departments in the division. It has been successfully carried out, and smallpox has been almost entirely checked in its progress, but few cases appearing among the troops. There is a large population in those portions of the islands that are still under the influence of the insurgents that can not be reached at present, but so soon as it is safe for vaccinators to go among the people they are sent. Vaccine farms have been established in the Department of the Visayas and in Mindanao, it having been found that the virus sent from Manila was often spoiled during the journey to the southern islands.

Means of transportation.—The hospital ship *Relief* has been utilized to expedite the transportation of medical supplies to points along the coast. During the campaigns under General MacArthur in northern Luzon and General Schwan in southern Luzon her service in this respect was invaluable, and without her there would have been great hardship and suffering. She followed the movements of the troops, touching at such points as were convenient to take off the wounded and those suffering from heat exhaustion, and landing such supplies as were needful. This service was often performed at great personal risk, and on several occasions the launch was fired on, Major Perley narrowly escaping injury at Vigan and at Bacoor. Her officers and men deserve great credit for their service on these occasions. Later on she took supplies to the ports on the west coast of Luzon and to those in the southern islands and the Camarines. I have in previous communications set forth the necessity for light-draft steamers for the use of the Medical Department in these islands. While the Quartermaster's Department claims theoretically to be able to meet the wants of the Medical Department in the transportation of supplies and to give precedence to it in loading its ships, it does not do so practically, and, as as a matter of fact, it can not. So far as the intentions of its officers in this division are concerned, they are good, but military necessities often dominate all other claims, and the Medical Department has been obliged to wait at times when the interests of the sick required prompt action. There can never, in my opinion, be a thoroughly efficient administration of the supply department of the medical service until it has its own water transportation. For hospital service on Laguna de Bay and for ports established on Manila Bay near the city the launch *New York* is supplied and has done fine service. Like the *Relief*, she was used with great success during General Schwan's campaign, and when his troops appeared at Santa Cruz at the end of the work she was in waiting with supplies and to take care of the wounded. Acting Hospital Steward Hobson, in charge, deserves special mention for excellent service on this launch. He has been on duty with her since the occupation of Manila, and has often been under fire. The only railway in Luzon is laid between Manila and Dagupan, and is about 120 miles long. It was of great service in bringing wounded to Manila during the expedition of General MacArthur, but no special arrangement had been made for their comfort on the cars in use. Two cars are now fitted with folding steamer bunks for eight patients. There is a small dispensary and a closet on each car, which carries a personnel of an acting hospital steward and two privates. Patients are transferred from points south of Angeles to the hospital at that station and north of that to Dagupan. The service as now organized is very efficient. Ambulances are assigned to commands wherever they are needed, and, while the number is small, they do good service.

Medical supplies.—Until quite recently there has been a general depot at Manila, with subdepots at such points in the division as could be easily reached by water and rail transportation and were convenient to the troops. These and all interior hospitals, base and regimental, were as fully supplied in May as their storage facilities would permit, to meet the wants of the troops during the rainy and typhoon seasons, when travel would be difficult or altogether interrupted.

The methods of issue from the United States are not as satisfactory as they should be, and the points of failure have been submitted to the Surgeon-General for his action. Much embarrassment has been experienced in the length of time consumed in getting supplies from the United States, and the irregularity of their shipment and arrival here have made it impossible to lay any definite plans for responding to calls on the central depot. The losses by disaster at sea have been heavy, and many packages have gone astray, which made it necessary to purchase somewhat extensively in local markets and from Japan to make good the deficits. The ordinary expenditure of medical supplies for the troops is much larger in this climate than in the United States, owing to the extensive prevalence of malarial and intestinal disorders and the necessity for prophylaxis. To this must be added the issues to small commands, which are proportionately larger than to commands of greater size. Although there is no official record of the fact, I am satisfied that a heavy drain also falls upon the supply department through issues to the indigent sick natives, whose appeals to medical officers for relief can not be resisted, in spite of orders forbidding such use of medical supplies that have been issued to the troops. As a general rule, however, it has been possible by judicious management to meet most of the demands, and there has as yet been no serious complaint of shortcomings in that direction. By a recent order of the division commander depots of supply have been established and equipped for the departments of Northern and Southern Luzon, and hereafter each department will issue its own supplies to the troops within its limits.

Requisition has been made for thirteen ice machines, which will be installed at various points in the division and supply the hospitals at all stations accessible to them. Five are already in successful operation at Iloilo, Cebu, Jolo, Cavite, and First Reserve hospital, Manila.

General remarks.—The officers and men of the division have been zealous and diligent in their service, and in many instances have cheerfully performed double duty, involving great hardship and personal risk. I wish to invite special attention to the admirable service performed by Maj. L. M. Maus, surgeon, United States Army, who took medical charge of the Second Division when its medical service was in a deplorable state. He soon established an efficient working system, restored order, replenished supplies; established hospitals, and procured reports that had been long neglected. He has displayed a high order of administrative ability, and deserves official recognition for his service.

Capt. John S. Kulp, assistant surgeon, United States Army (now major and surgeon, United States Volunteers), has won well-deserved promotion for his ability in the management of hospital No. 3, Manila, and in the organization and successful conduct of the school of instruction for the Hospital Corps.

A number of medical officers have distinguished themselves by special service in the field and in administrative positions, receiving commendation and special mention from the officers of the line with whom they served. Among them I desire to mention:

Capt. Paul Shillock, assistant surgeon, United States Army, special field service.

First Lieut. Richard P. Strong, assistant surgeon, United States Army, special field service and work in pathology.

First Lieut. Powell C. Fauntleroy, assistant surgeon, United States Army, organizing and management of hospital at Angeles.

Maj. Franklin A. Meacham, surgeon, United States Volunteers, special field service.

Capt. George W. Mathews, surgeon, Thirty-sixth Infantry, United States Volunteers, special field service.

Maj. George H. Penrose, surgeon, United States Volunteers, special field service and hospital organization.

First Lieut. Isaac W. Brewer, jr., assistant surgeon, United States Army, special field service.

First Lieut. Henry S. Greenleaf, assistant surgeon, United States Army, with Sixteenth Infantry in the field and chief surgeon, Aparri.

First Lieut. John Carling, assistant surgeon, Thirty-fifth Infantry, United States Volunteers, special field service.

Contract Surg. Joseph C. Reifsnyder, special field service.

Contract Surg. H. E. Stafford, special field service.

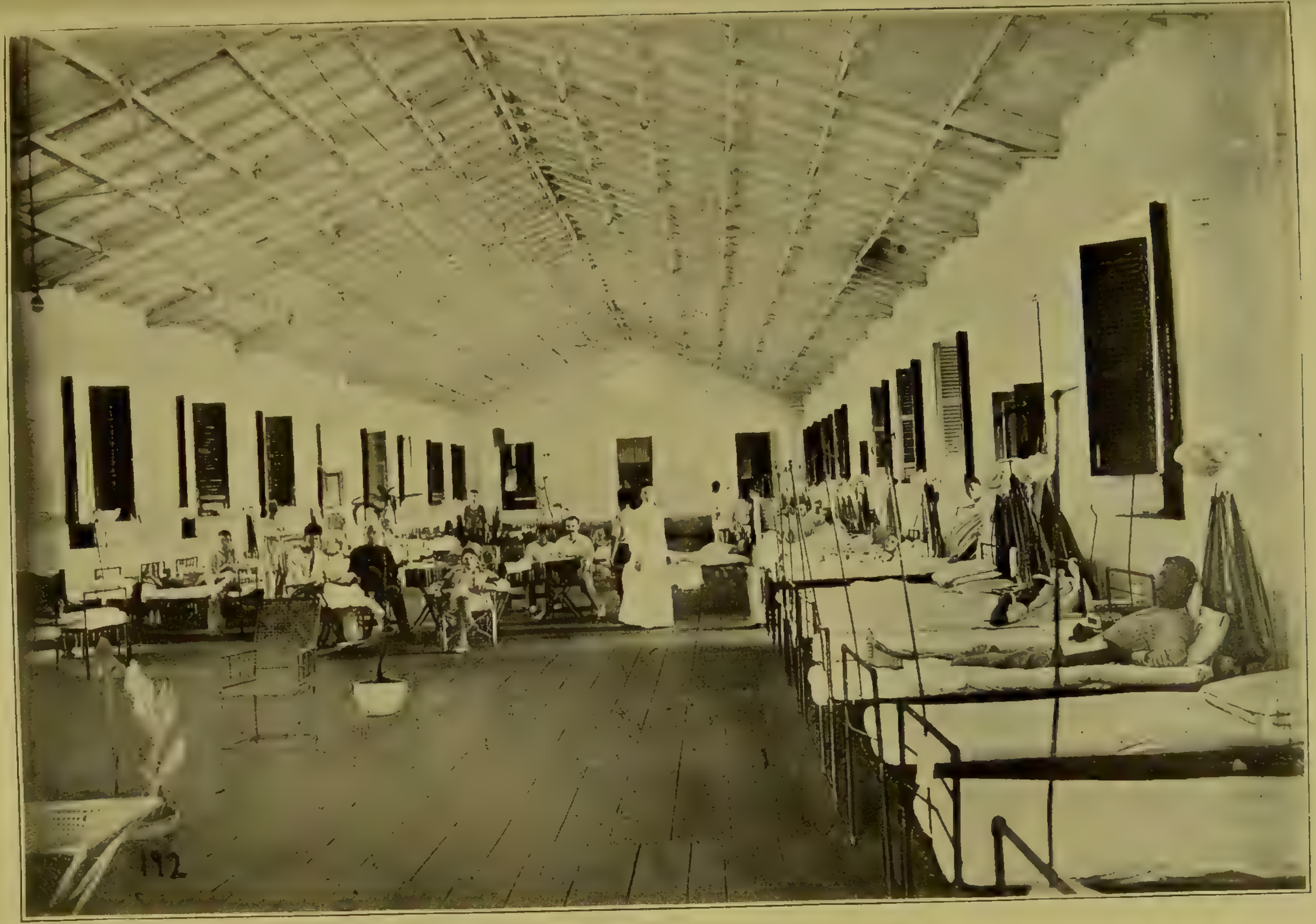
And others whose names have been previously brought to the notice of the Department. I earnestly trust that in the interest of the service and of the officers their special duties may receive recognition and that whatever promotions are at the disposal of the Department for officers in this division may be given exclusively to those officers who have earned them by faithful and meritorious service in the division.

Finally, I wish to join with the medical officers in this division in expressing our appreciation of the devotion to duty of our late comrades First Lieutenants Westnedge and Higley, assistant surgeons, United States Army, whose lives were sacrificed while caring for the sick and wounded that had been placed under their charge. Although sick men themselves and frequently urged to enter hospital, they remained faithfully at their post of duty until compelled by physical weakness to leave it; too late, however, to save their lives.

By reason of their bulk, the separate reports of chief surgeons and commanding officers of hospitals are forwarded direct by mail.

REPORT ON THE FIRST RESERVE HOSPITAL, MANILA, P. I., BY MAJ. W. R. HALL, SURGEON, UNITED STATES ARMY, COMMANDING OFFICER.

The First Reserve Hospital was formerly the Spanish military hospital. It is located about one-fourth of a mile east of the walled city, between it and the Pasig River, which forms the eastern boundary of the hospital grounds. The Spanish hospital proper consisted of a series of buildings erected around a rectangular courtyard, wards on each side, kitchen and dispensary at one end, and a ward and administrative offices at the other end. Storehouses and residences of officials occupied the space between the eastern end of the hospital buildings and the river. A large ᗰ-shaped building was used for chapel purposes and rooms for priests and nursing sisters. This wing is now used for the dispensary, surgical ward 7, and operating rooms. The front of the grounds is formed by Calle Arroceros. The northern side is closed by a high stone wall, separating the grounds from a market; the southern side is bounded by Calle Conception, on which street, about 100 meters east of the hospital, is the officers' ward. All the buildings east of the wall are now used



FIRST RESERVE HOSPITAL, WARD NO. 3.

by the medical supply depot for storerooms except one, which is used by the hospital for laboratory purposes. Across Arroceros street, opposite the northern half, is the botanical garden, the pride of Manila, while the southern half is faced by a large, fenced-in grassplot, containing a good-sized brick building, used in Spanish times as a school of arts and engineering, but now used as a warehouse by the medical supply depot and as a laboratory and repair shop by the Signal Corps. On January 1, 1900, most of the tent wards belonging to the hospital, as well as tents for quartering the hospital corps detachment, were located on this portion of land, but as the hospital was contracted in bed capacity these tents were removed, and now, June 1, 1900, the plat is vacant except for the building mentioned. The inner quadrangle is neatly laid out with grassplots and flowers and planted with tropical trees and bushes. Near the kitchen is situated a frame structure used as a reading room for patients. The ground on which the hospital is built has a gentle slope toward the Pasig River. The wards, built of a stone composition, mostly covered with tile roofs, are roomy and well ventilated. They are without ceilings and all have an abundance of large windows. The sewerage was far from satisfactory during January and February, but within the last two months a new system of sewerage has been installed. Nearly all the buildings are supplied with modern water-closets, and most of the old faults have been remedied. Each ward possesses a bathroom with shower bath, and three bathrooms, with four showers in each, are provided for the Hospital Corps. The water supply is ample and of good quality, obtained from the city water system. The drinking water is distilled and is obtained from the ice plant. Rations are drawn every ten days. Cooking is done by Chinamen, paid out of the public funds. The rations issued to the men are of the best, and there is sufficient variety to prevent sameness. On January 1 the wards in use numbered 27, of which 11 were tent wards and the remainder were in buildings.

A necessary institution connected with this hospital is the steam launch. This is a good-sized boat, capable of accommodating 50 to 60 patients with the necessary attendants. In a place like this, where so much of transportation is by water, a steam launch is an absolute necessity. Patients are brought on the boat to this hospital, as well as to Santa Mesa Hospital, from the various posts on the lake and river, as well as from the shores of the bay. Patients are transferred from hospital to the transports about to depart for the United States, the sick and their nurses are taken from steamers arriving in the bay and are transferred to hospitals ashore, parties of hospital corps men arriving on transports are landed with their baggage, emergency calls from posts on the river or on the lake for medical officers or supplies are answered, and official inspection of different posts are made by the chief surgeon. The crew consists of natives, paid by the Quartermaster's Department.

Smallpox hospital.—The smallpox hospital, which is a part of the First Reserve Hospital, is 500 meters south of the hospital proper. The principal building is a frame structure with a nipa roof, 111 by 54 feet, and is divided into two wards. Besides this there is a tent ward consisting of two framed and floored hospital tents for variola suspects and one tent ward for bubonic plague, besides tents for storerooms and quarters for the attendants and guard. The staff of the smallpox hospital consists of an acting assistant surgeon, five privates of the Hospital Corps, and two native laborers. The surgeon as well as the attendants live on the premises.

Laundry work.—The laundry work is done at a steam laundry in the city. The linen is carted away every day and returned clean and ironed every second day. The average cost during the five months from January 1 to June 1, 1900, was $1.05 per hundred pieces.

Diet and kitchens.—The rations for the Hospital Corps are drawn every ten days from the commissary and are sufficient in quantity, of good quality, and sufficiently varied in composition. The articles for patients' diets are purchased from the commissary from the daily allowance of 40 cents, which is found ample to provide good, sufficient, and wholesome diet. The food is cooked by a Chinese cook and is served by hospital corps men. The light-diet kitchen is a separate establishment. Supplies are obtained as needed from the hospital commissary storeroom.

A pathological laboratory, well and thoroughly equipped, is connected with this hospital. At the present time First Lieut. R. P. Strong, assistant surgeon, United States Army, is in charge. All examinations of blood, urine, fæces, sputum, and cultures of all varieties, as well as examinations of specimens obtained from necropsies, are made at this laboratory. These are made not only for this hospital, but for all hospitals and commands in and near Manila, which lack facilities for microscopical investigation or chemical analysis. All necropsies are made at the morgue attached to the hospital.

Ambulance service.—The land transportation consists of 4 ambulances and 16 mules. These vehicles call about the city and outlying stations, at boat landings and the railroad station, for patients whose arrival or whose needs are telegraphed to the hospital. There is also a separate ambulance for smallpox patients.

Ice machine.—The ice machine is owned by the Medical Department, but is operated by civilian employees paid by the Quartermaster's Department. The daily output is about 3,700 pounds. From this a sufficiency is retained for the use of this hospital, while the balance is supplied to hospital No. 3, the Second Reserve Hospital, occasionally to Santa Mesa Hospital, and on approved orders to some of the smaller regimental hospitals in the city. On several occasions ice has been sent from here by launch to the hospital at Bacoor, across the bay. A distilling apparatus is connected with the ice plant, which furnishes pure drinking water to this hospital and adjacent hospitals, also to some of the commands in the city. A sterilizing apparatus is operated in connection with the engine running the ice machine.

Female nurses.—There were 77 contract nurses at the hospital on January 1, 1900. During the month 22 were sent away to other stations. In February, 5 more left the hospital, and as the bed capacity of the hospital diminished more of the nurses were detailed to other stations until the number on duty June 1, 1900, was but 19. The nurses' quarters are situated about ten minutes' walk from the hospital. The quarters consist of a large square house, two stories. It contains thirteen sleeping rooms, each accommodating four nurses, large dining room, bathrooms, and kitchen. Part of the ground floor is taken up by a large airy hall or lobby forming a delightful place for rest; in the second story is a large reception room. The grounds around the house are very beautiful. Palms, mangoes, banana and other tropical trees grow in abundance, while a handsome fountain adds to the beauty of the place. The nurses draw the regular army ration, which is prepared for them by a Chinese cook under the supervision of one of the nurses. The general health of the nurses has been good. Ambulances are provided to carry the nurses to and from the hospital during inclement weather and at the lunch hour. The work of the nurses has been satisfactory. They are faithful, conscientious, and untiring in their efforts to assist the medical officers in the care of the sick and wounded. Several nurses have volunteered their services for smallpox cases. The surgical work of the nurses at this hospital has been considerable and successful. At the present time the demand for nurses from the different posts in these islands exceeds the supply. A dietist has charge of the light and special diets at this hospital.

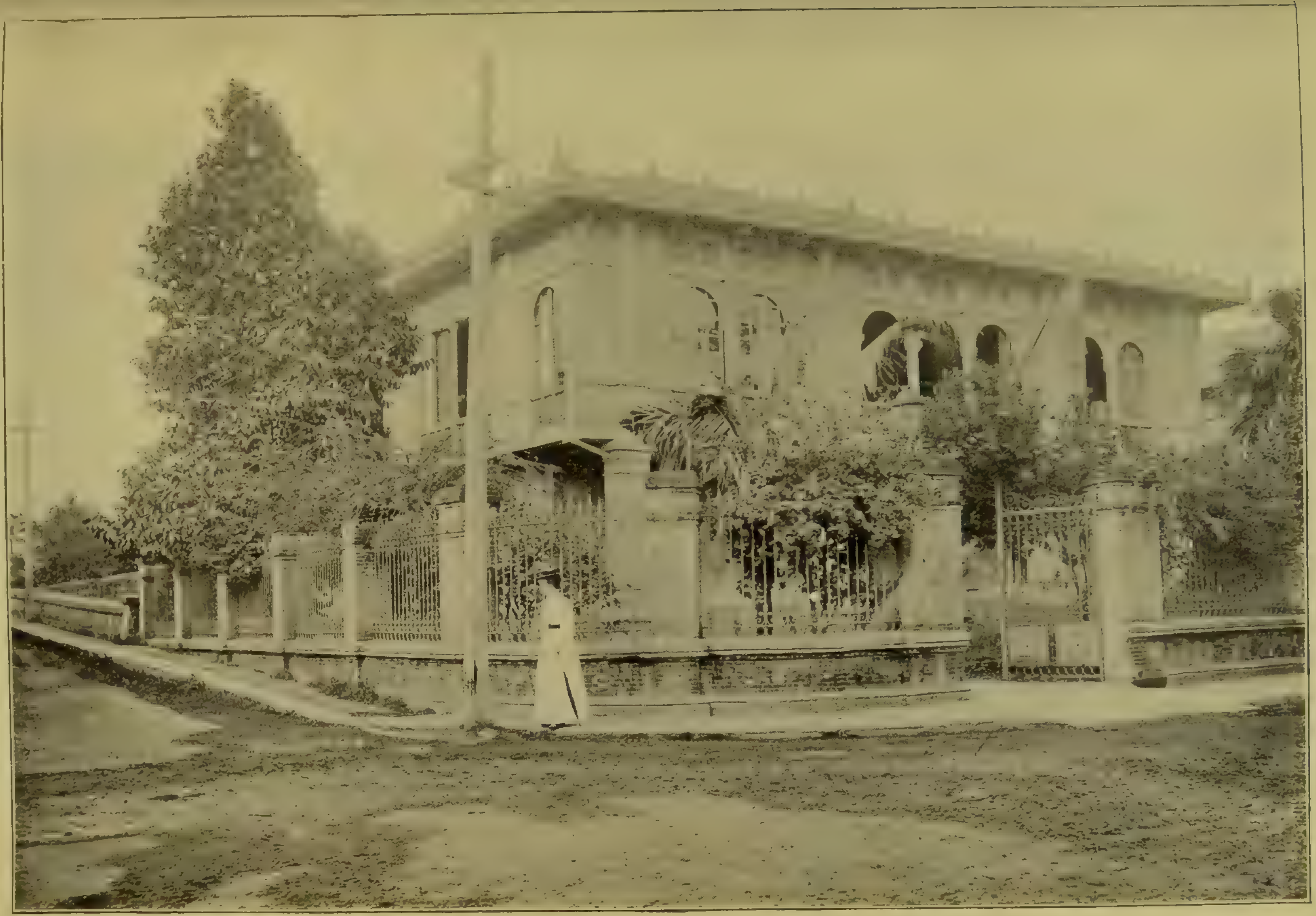
Hospital Corps.—The hospital corps detachment on duty at this hospital on January 1, 1900, numbered 7 hospital stewards, 3 acting hospital stewards, and 183 privates. The majority of the men deserve credit for the manner in which they performed their duties, often very arduous, as during the times when the wards were filled up to their limits. It then required patience, self-denial, and zeal to keep up with the work and provide the necessary care for the sick and wounded. Especial credit is due to men who performed the duty of wardmaster in some of the fever and dysentery wards. They worked early and late, doing their best to relieve and comfort the suffering and render the best possible aid to the ward surgeons. In view of the small amount of pay these men receive, it shows that the chief motive was an unselfish desire to help suffering humanity. It would seem not only just, but also good policy, if some inducement were held out to men to perform duty as wardmaster by a little higher pay than the other privates of the Hospital Corps receive. The hospital stewards on duty at this hospital during January 1 to June 1 have invariably performed their duties faithfully and well.

The surgical department has always occupied a prominent position in this hospital, a good many conditions combining to make it the most important in the city of Manila. The operating rooms are situated in the building fronting on Calle Arroceros, and comprise three rooms—one for operations; one for examinations, minor operations, and dressings; and an annex for dressing of Dhobie-itch cases, and the like. The staff consists of an operator, two competent hospital corps men, and two female contract nurses. The equipment is complete, and the results have been good. A ward for surgical cases adjoins the operating room; thus patients, after capital operations, have to be carried but a short distance to their ward. For a report of some of the surgical work done at this hospital see page 326.

REPORT ON THE SECOND RESERVE HOSPITAL, MANILA, BY MAJ. EDWARD B. MOSELEY, SURGEON, UNITED STATES ARMY.

The Second Reserve Hospital was opened October 3, 1898, by Capt. F. R. Keefer, assistant surgeon, United States Army, in a building in the Malate district of the city of Manila, known as the Convent of the Assumption.

The building, which was a boarding school for girls, is modern, built of brick and stone in the best manner, has ceilings 18 feet in height, handsome tiled floors in most of the large rooms, enormous corridors, and where tiles are not used the floors are made of native hard wood, the boards averaging 14 inches in width, and taking



NURSES' HOME, MANILA, P. I.

a polish like mahogany. The windows on all sides of the building average 9 feet high and 8 feet wide, and give ample light and ventilation in most of the wards.

The building is in the form of an irregular L, and is divided in such a way that twenty wards are available, ranging in size from 27 by 28 feet to 44 by 75½ feet, in addition to which are two corridors in the second-story, 149 by 13½ feet and 215 by 13½ feet in size, which are used for the accommodation of patients, to which they are particularly adapted, being on the outer face of the building, and therefore particularly light and airy. The wards opening on these corridors receive a large amount of light and air owing to the enormous size and large number of the windows in the corridors. The surgical ward and the largest medical ward are particularly well adapted to their respective uses, being very large, light, and cheerful.

On the first floor, around the greater portion of the building, is a porch, floored with handsome tiles, which can be inclosed by movable screens which hang between the pillars supporting the upper second-story corridors. These screens can be lowered to exclude the sun or rain, or to convert the corridor into wards for convalescent patients in case of necessity.

The chapel, a large room, is filled with property belonging to the convent, and can not be used for any purpose, this being specified in the lease made with the sisters by the government.

Dining rooms for full and light diet patients are situated on the first floor; also offices of the commanding officer and clerks. The main kitchen is in a temporary building, erected in the rear of the hospital, which contains four army ranges, and is supplied with water and other conveniences. The special-diet kitchen is in the second story at the end of one wing; it is 43 by 44 feet, with windows on three sides, giving ample light and ventilation. The special-diet cooking is done on several oil stoves, which are very useful for this purpose, as they do not produce the great heat in the building that would be caused by coal stoves, nor do they produce ashes and dust.

A bathroom containing eight porcelain tubs, for use of patients and hospital corps men, is situated at one end of the building on the first floor. Bathrooms and water-closets for medical officers and sick officers are in the opposite end of the building in the second story, near the rooms occupied by resident medical officers and the officers' wards, which accommodate 12 patients.

The dry-earth system of sinks is used for patients and hospital corps men, the boxes being placed in tents conveniently located. Excreta, properly disinfected, is removed by civilian scavengers, under contract, twice a day.

The hospital corps men sleep in roomy and well-lighted dormitories on the ground floor, men on night duty having a separate room, where they can be undisturbed.

Two storerooms on the first floor are used, one for medical property and one for clothing, personal property, and arms of patients. In the rear, at a good distance, is built a stable for the accommodation of government animals and horses of officers. In a separate building is a storeroom for commissary supplies and for carpenter shop and storage of bulky articles. A dispensary, with separate storeroom for drugs and medical supplies, is situated about the center of the building on the first floor.

The grounds around the hospital, about 10 acres in extent, are entirely surrounded by a high stone wall and contain numerous trees, flowering plants, fountains, etc., making the place particularly retired from public view, but very cheerful for patients, who are able to sit in the shade and obtain the benefits of the sea breeze, which is usually strong, owing to the proximity of Manila Bay.

The capacity of the hospital is 312 without crowding, and an increase of 50 could be provided for at any time. It is conducted by 4 medical officers, 2 hospital stewards, 3 acting hospital stewards, 58 privates of the hospital corps, 12 contract nurses, and 19 Chinese and native employees, the latter being employed in the kitchens and various menial work.

This building is so remarkably well adapted by location, by its adaptability as to light, air, sun, and cheerful surroundings, that it is to be hoped it will be continued under lease for hospital purposes indefinitely.

Report on Hospital No. 3, by Capt. John J. Kulp, Assistant Surgeon, United States Army, Commanding the Hospital, Rendered to the Chief Surgeon, Division of the Philippines, June 15, 1900.

Hospital No. 3 was established by General Orders, No. 7, Department of the Pacific and Eighth Army Corps, January 19, 1900, from the supplementary wards, without change of personnel or administration.

The institution consists of seven large wooden buildings, each having a single story, elevated 3 feet above the ground. The ceilings are high and the ventilation practically perfect. The general plan is that of a triangle attached to a square. Around the sides of the square are six wards, each having an average capacity of forty-eight beds, and occupying the sides of the triangle are the baths, laundry, main kitchen, cold storage, carpenter shop, barracks, commanding officer's quarters, quartermaster storehouse, and clothing room. In the building which forms the front of the square are the offices of the commanding officer, officer of the day and registrar, the laboratory, consultation room, commissary storeroom, linen room, medical storeroom, and dispensary. Ward F (acute surgical), which is also in this building, communicates directly with the operating room.

The situation of the hospital is in the district of Ermita, just beyond the walls of the city and about 300 yards from the bay. The proximity of the latter, and the Luneta, renders the place an agreeable one for convalescents, while the buildings and grounds are well adapted for hospital purposes. In this connection it may be stated that the illumination is by incandescent lights, the water supply is from the city mains, and garbage is carried away by boats twice daily.

The bed capacity of the hospital for patients is 297, with 57.5 square feet of floor per bed, and as a rule there are few vacancies. Each ward has attached to it rooms for the hospital corps men on duty and for the property of patients. The number of each bed corresponds with that of a particular locker, and also with that on the patient's card in the office of the registrar. Incoming patients are examined by the medical officer of the day as soon as received; the diagnosis is confirmed if practicable, the diet outlined, and any necessary medication prescribed before the patient is sent to his ward. Each patient is seen at least twice daily by his ward surgeon, who is responsible for everything pertaining to his ward. A permanent consulting board, consisting of the commanding officer, the officer of the day, and the surgeon, is called whenever requested by the latter. The laboratory is equipped for all ordinary clinical work, and the pathologist makes examinations of blood, urine, sputum, or fæces whenever requested by the ward surgeons. A complete record of treatment and of the more important symptoms is kept and filed for reference. Meals for convalescents are served in the main dining hall, which seats 240. Four regular diet lists are furnished, one of which is entirely in the hands of the ward surgeon. A record is kept of every meal served.

Certificates of disability.—This hospital receives for observation all men who have been recommended for discharge on surgeon's certificate of disability. This entails much labor of the highest responsibility, no less than 198 men having been sent to the United States for discharge, and a number convicted of malingering or returned to duty because of recovery or absence of disability. The most common forms of disease are diarrhea, dysentery, malarial fever, and skin and pulmonary affections. Since the renaming of the hospital 1,038 patients have been admitted (whole number 4,207), of whom 5 (whole number 13) have died.

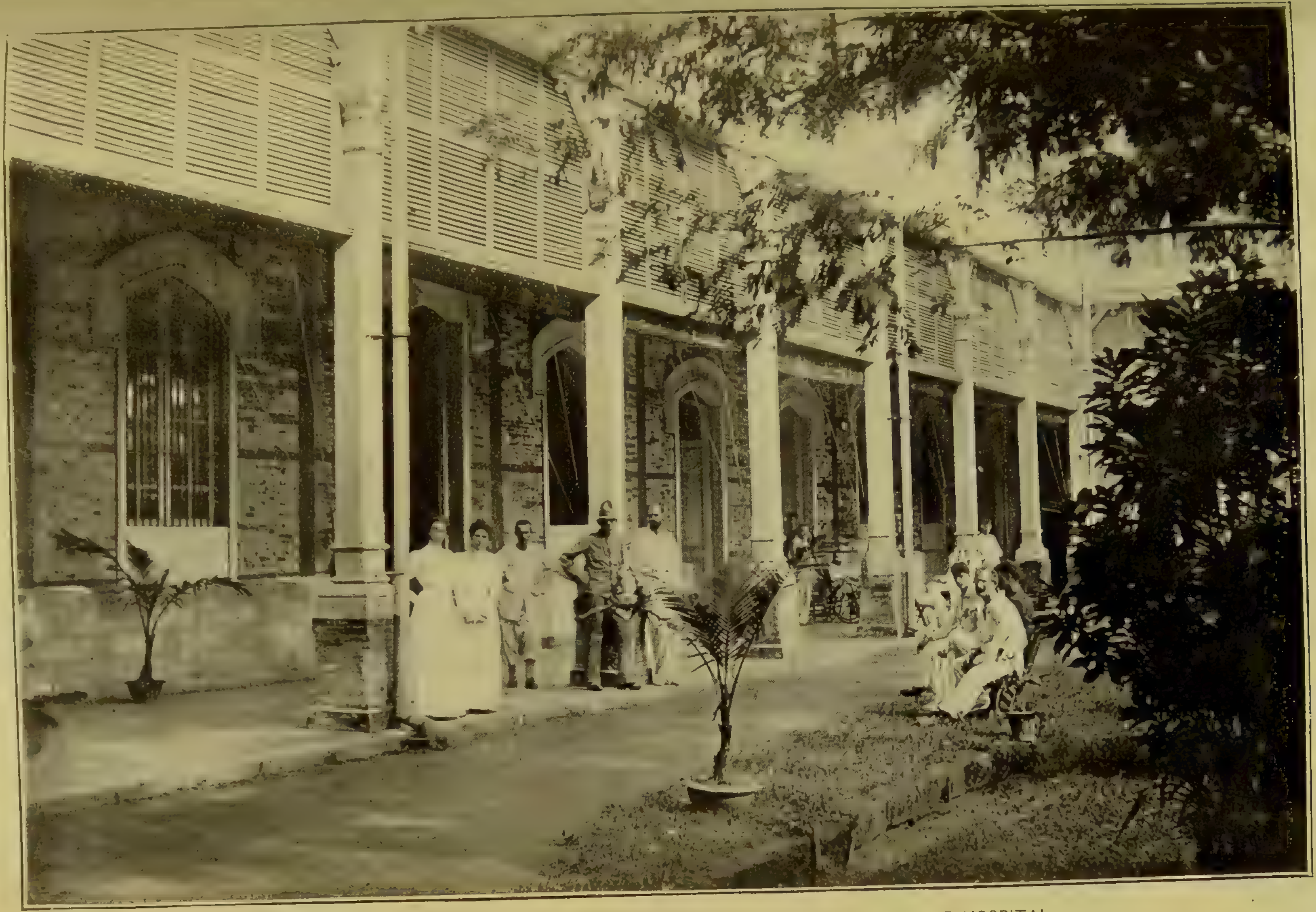
Second in importance only to the treatment of the sick is the instruction of the men of the Hospital Corps. The sanitary soldier of to-day has so many and such varied duties that it is considered indispensable that he should see service, not only in the field and hospital, but in every department of the latter as well. In the field he shares every danger with his brother of the line, and is of value in proportion to the training he has received in garrison. This training consists of (*a*) instruction, (*b*) discipline, and (*c*) experience.

The practical instruction in this hospital consists in handling patients, first-aid exercises, and demonstrations and bedside instruction in ward work. The theoretical instruction is by means of lectures on pharmacy, elementary anatomy, minor surgery, first-aid regulations, clerical work, and nursing. No better form of discipline than military discipline is known, and no better method of enforcing exact and unquestioning obedience is known than by military drill. Every man on duty in the hospital is required to attend five drills weekly, and a soldierly bearing and proper uniform is insisted on at all times. Experience in the manifold duties of the hospital corps private can be best given by constant rotation in station. This involves much labor on the part of the officers of an institution in order not to impair its efficiency, but the final results are believed to justify the extra work.

The following personnel is attached to the hospital:

Medical officers, 2; acting assistant surgeons, 3; noncommissioned officers. 7; privates, 50, and natives, 11; total, 73. The hospital furnishes its own guard, and there are no white civilians, either male or female, attached to it. It is believed that with a properly instructed detachment civilian aid is not only not necessary, but is injurious both in regard to the maintenance of discipline and as tending to prevent the proper instruction of the Hospital Corps.

Repairs and alterations.—Since their use by the medical department these barracks. formerly belonging to the Seventy-third Spanish Infantry, have been so remodeled and improved as to be hardly recognizable. The filth natural to every building in Manila was not lessened by volunteer occupation, and when first assigned for hospi-



VERANDA AND ENTRANCE TO FIRST-STORY WARDS OF SECOND RESERVE HOSPITAL.

tal purposes a more dilapidated lot of buildings it would have been difficult to find. The floor space is three-fourths of an acre in extent, and beneath every building there was tons of filth. When it is considered that the institution has been entirely reroofed, repainted, complete cement walks built, and many portions remodeled, some idea of the transformation can be obtained. A large portion of this work has been done by the men of the Hospital Corps, who have displayed an intelligent interest which is gratifying.

The military hospital differs from the civil in almost every particular of patient, administration, and personnel. Its commanding officer possesses graver responsibilities and greater authority than that of a mere medical superintendent. The technical knowledge of decisions, regulations, and papers which is required to protect the Government, on the one hand, and prevent injustice to the soldier patient, on the other, can be learned from neither book nor school. Physicians and surgeons can always be obtained from civil life in times of sudden army expansion, and after the necessity has passed can return to their waiting homes. This is not the case with the medical officers, whose lives and services are the property of the Government. Whatever increases their value is a gain to the service, and it seems but natural that whenever practicable these men should be taught administrative work in its only school—that of experience. It is believed that the regular medical officers who have served in this hospital have profited by this technical experience so necessary to the military surgeon.

REPORT OF MAJ. H. P. BIRMINGHAM, SURGEON, UNITED STATES ARMY, ON THE SANTA MESA HOSPITAL, MANILA, P. I., MADE TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, JUNE 14, 1900.

This hospital is located at Santa Mesa, a suburb of Manila, and is distant about 3½ miles from division headquarters in the walled city. It is built on a small elevation, or mesa, about 600 yards from the Pasig River and at an elevation of about 60 feet above tide water. The buildings, which were originally intended for infantry barracks, although never used as such, were first occupied by the medical department on November 4, 1899, and the first patients were received November 10, 1899. The site is a good one, comprising as it does a peninsula or neck of land near the confluence of the San Juan and Pasig rivers, and having a decided slope on three sides which insures good surface drainage. The country is open for a considerable distance on either side and unobstructed by buildings on all sides. This with the elevation gives a full sweep to the prevailing southeast breeze and makes a difference in temperature between here and the city of from 4° to 5°, which is the difference in excessively hot weather between suffering and comparative comfort.

The buildings comprising the hospital are the so-called nipa structures common to the country, consisting of a bamboo framework thatched with the leaves of the nipa palm. They are raised from 2½ to 5 feet from the ground, depending on the slope, and the eaves project 6¾ feet beyond the front walls, forming a covered veranda of that width. The walls and partitions are 8 feet in height and do not reach within several feet of the roof at the nearest point in front, thereby permitting of the most perfect ventilation, the projecting eaves preventing the entrance of rain. As a matter of fact the occupants are virtually living in the open air sheltered from sun and rain. This makes a building which is nearly ideal for hospital purposes in this country.

The hospital is laid out in quadrangular form, the quarters for the female nurses and three wards forming one side, the administration building, quarters for noncommissioned officers, barracks for the men, and two wards forming the other side, while the officers' quarters and storehouses are at the north and south ends, respectively. Four new wards recently constructed are built at right angles to the wards on the east side so that the kitchens and dining rooms of the old wards, which are ample in size, may be utilized for the new wards as well. These wards are not yet equipped. The building used as a laboratory, operating room, and dispensary is within and south of the center of the quadrangle and the guardhouse is at the extreme south end. Barracks for 100 men and 4 officers will be constructed shortly southeast of the hospital, for the use of the company of infantry now on duty here as guard.

The capacity of the hospital is 920 beds—5 wards of 120 beds each and 4 of 80 beds each. The personnel consists at present of 5 commissioned medical officers, 5 acting assistant surgeons, 4 hospital stewards, 2 acting hospital stewards, 122 privates of the Hospital Corps, 25 female nurses, and 64 civilian employees. The last consist of 34 Chinese cooks and dining-room boys, 2 Filipino carpenters, 24 Chinese scavengers, 4 ambulance drivers, and 2 Filipino seamstresses.

An ambulance train of seven ambulances and the necessary wagons for transportation of supplies form a part of the equipment of the hospital.

The dietary for the sick, under the allowance of 40 cents for each patient per day, as supplied by the subsistence department, has been ample and satisfactory.

The work of the laboratory, on account of lack of space, is carried on in a room in the same building with the dispensary and operating room. It is wholly inadequate, and the equipment is by no means complete. Plans and estimates of a building for a modern laboratory and operating room combined, which met with the approval of the chief surgeon, have been forwarded. It is to be hoped that this building will be erected at an early date. Requisitions to complete the laboratory both in the pathological and bacteriological departments have been forwarded, approved by the chief surgeon.

The work done in the laboratory, although the equipment as stated is incomplete, has been very satisfactory and has consisted of blood examination of all febrile cases, examination of sputa, stools, and other discharges, the examination and preparation of pathological specimens, and X-ray work.

The water supply is furnished from the mains of the city waterworks. It is ample in quantity and of good quality, but to insure against any possible infection all water used for drinking is boiled. The Waterhouse-Forbes apparatus will be introduced as soon as it can be supplied. Ice is supplied in a sufficient quantity from a private ice plant in the city.

A system of sewerage has just been completed for this hospital, the main sewer of which discharges into the Pasig River. In the rear of each ward are the bathrooms and closets. The method of disposal of excreta in use at present is that of the dry-earth closet. These closets are emptied and thoroughly cleaned twice daily by men employed by the quartermaster's department, and the means employed are as unobjectionable as this method will admit of. The dry-earth closets will be replaced shortly by a system of water-closets with sewer connections. In each bathroom eight showers are available for the advanced convalescents; all others are bathed in the wards. The ward officers are charged with the enforcement of the bathing regulations.

The total number of cases admitted since the opening of the hospital is 3,110, of which 2,178 were returned to duty; 8 were discharged from the service, 7 for disability and 1 at expiration of term of service; 410 were transferred to other hospitals; 28 otherwise disposed of, and 30 died.

Of the total number of diseases treated a large majority were of malarial and intestinal origin, 1,129 cases of malarial fever being recorded, and 333 and 288 of diarrhea and dysentery, respectively.

There were 49 cases of typhoid fever admitted, and when admissions from this disease on these islands is compared with the admissions for the same cause in the home camps and in Cuba and Porto Rico during the Spanish-American war, the comparative immunity from this disease here is notable.

The malarial fevers were almost wholly of the æstivo autumnal variety, although for the most part not of a pernicious type. A profound degree of anæmia, however, followed in many instances, which was very rebellious to treatment, and many patients were invalided home from this cause.

Of the cases of dysentery treated here about 50 per cent were of the amœbic variety, as shown by microscopical examination of the stools. As many of the patients had received treatment for varying lengths of time at base or other hospitals, this estimate is probably too conservative. Another interesting fact is that the amœbic seemed to be more amenable to treatment than the nonamœbic variety. The acute symptoms in most cases responded promptly to the ipecacuanha treatment, 3 to 4 grams, regardless of variety, and with rest in bed and carefully restricted diet many of these cases progressed uninterruptedly to recovery. The majority of the cases admitted, however, were subacute or chronic in character. Blood examinations in nearly all of these cases showed the presence of the æstivo autumnal malaria parasite, generally of the hyaline variety, and the administration of quinine was an important part of the treatment.

The diarrheas admitted did not differ materially from the camp diarrhea seen elsewhere, and were, as a rule, due to the usual causes. A noteworthy fact was the large number of patients admitted for diarrheal disorders who had defective teeth. Even sound teeth seem to deteriorate very rapidly in this climate, and the necessity for a rigid examination of men suffering from defects of this nature who are enlisted for service here and the further necessity for competent dentists to attend to the teeth of the men is obvious.

The amount of surgical work done at this hospital has not been very extensive, owing to the more easy access of the cases coming from the front by rail or boat to the hospitals in the city, and furthermore to the fact that the operations of the troops in the field since the establishment of this hospital have not been as extensive as formerly.

In conclusion, I would like to invite attention to the conscientious and painstaking work done by all connected with the hospital, including the medical staff, the hospital corps detachment, and the female nurses. All worked harmoniously and unremittingly for the common end—the welfare of the sick.

REPORT ON THE CONVALESCENT HOSPITAL, CORREGIDOR ISLAND, MADE JUNE 1, 1900, TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, BY MAJ. W. W. GRAY, SURGEON, UNITED STATES ARMY, COMMANDING HOSPITAL.

Corregidor Island lies across the entrance of Manila Bay from the China Sea, distance 26 miles from the city of Manila. The island is 3 miles long and from one-fourth to three-fourths of a mile wide. The greater part of it rises abruptly from the water, reaching an extreme elevation of 550 feet above the sea. Several plateaus of different sizes are found on the higher points of the island. The hospital is situated on the shore of a small inlet or bay on the north side of the island, and about midway of it.

The hospital was established by Maj. W. O. Owen, brigade surgeon, United States Volunteers, November 25, 1898, and consisted at first of tents and several old Spanish buildings, with a capacity of 250 beds. In the summer of 1899, while under the command of First Lieut. Henry Page, assistant surgeon, United States Army, plans were drawn and contracts let for the present hospital. The first of the new buildings was occupied September 18, 1899. The present hospital has a capacity of 220 beds, and consists of the following buildings:

(1) Ward A, a one-story L-shaped structure, 92 by 92 by 12 feet; capacity, 100 beds.
(2) Ward B, a one-story rectangular structure, 62 by 28 by 12 feet; capacity, 20 beds.
(3) Ward C, a one-story L-shaped structure, 91 by 68 by 12 feet; capacity, 80 beds.
(4) Officers' ward, a one-story rectangular structure, 68 by 28 by 12 feet; capacity, 20 beds.

These four pavilions are constructed of wood, with corrugated iron roofing, elevated about 3 feet from the ground. Sliding windows encircle the buildings and permit the wards to be practically thrown open to the outside air, giving the most complete ventilation. This is a great advantage in this climate, and permits the air space per man to be reduced. Only at rare intervals is it necessary to close the windows, and then for a short time during driving wind and rain storms. Covered porches 5 feet wide extend around the buildings.

The administration building is 50 feet square and two stories in height. The lower story is used as offices; the upper as a dormitory for the detachment of the hospital corps. This building is constructed of wood, with metal roof, and on the general plan of the pavilions. All the buildings are painted white inside and out, with green trimmings, and present a very neat appearance. Storerooms, dispensary, and operating rooms are located in two adobe buildings constructed by the Spaniards. They have been recalcimined and painted, and answer very well the purposes for which they are used. Temporary nipa buildings have been used for the kitchens, but a large and commodious dining hall and kitchen is under construction, and will be completed in a short time. The medical staff are quartered in a structure built by the Spaniards, and formerly used (I believe) by the Spanish officers stationed here. It is adobe in structure, with nipa roof. It consists of three good-sized bedrooms and two smaller ones, besides sitting and dining rooms; all on one floor. These comprise the principal buildings on the grounds of the hospital. Plans have been drawn and approved for the construction of additional wards, which will double the present capacity of the hospital, but as the rainy season is so near at hand they will not be completed before fall.

The site of the hospital slopes gradually back from the bay, rising rather abruptly to 50 or 60 feet above sea level at the officers' ward. The buildings are somewhat irregularly located, due to the site; a main street runs east and west through the grounds, with several streets north and south. The natural drainage is good; open drains carry the surface water to the bay; no closed sewers are used. All excreta, garbage, and débris of every kind is collected daily and carried in open boats out to the sea about half a mile from the shore and dumped into water 50 or 60 feet deep. By this method, under the immediate charge of a noncommissioned officer, the buildings and grounds are kept in thoroughly sanitary condition.

At present tents with dry-earth latrines are used. These are satisfactory during the dry season; but plans have been drawn and approved for comfortable closets and bathrooms. Movable bath tubs are used for the wards. A series of shower baths for those able to walk are located a few yards to the side of one of the main wards.

A reservoir constructed about three-fourths of a mile distant from and 100 feet above the site of the hospital collects water from a small stream. This water is conveyed in pipes to and through the grounds, and is used for the general purposes of the hospital. It has thus far proved sufficient in quantity, although no rain has fallen for nearly six months. A small condensing plant furnishes pure and wholesome water for drinking. Ice is purchased in Manila. A small ice plant would add much to the comfort and convenience of the hospital and permit the keeping of a larger supply of meat during the stormy season, when it is not always practicable for a launch to visit the island daily.

A small bakery operated by members of the hospital corps furnishes excellent bread to the hospital. The supplies furnished by the commissary department have, as a rule, been of excellent quality. Chickens, eggs, and other articles of diet not directly obtained from the commissary have been purchased partly in Manila and partly from natives residing on Corregidor Island and contiguous territory. The lack of good fresh cow's milk has been a great deprivation, but it is impossible to obtain it in quantity in the islands. The medical purveying department in Manila has furnished, with few exceptions, all medicines and supplies asked for on approved requisitions. A steam launch makes daily trips, except Sundays, between Manila and Corregidor Island, carrying patients, mail, and supplies. Telegraphic communication with Manila is had by cable to Naic and telegraphic line from Naic to Manila on the main shore.

The personnel of the hospital at the present time consists of 1 major and surgeon, United States Army, 3 acting assistant surgeons, 2 hospital stewards, 3 acting hospital stewards, 52 privates of the hospital corps, and 8 female contract nurses, with 4 Chinese cooks, 3 Chinese helpers, and 10 Filipinos employed as scavengers.

Corregidor Island in some respects is almost an ideal place for a convalescent hospital in the Philippine Islands. It enjoys a remarkably equable climate, a mild sea air, with breezes blowing the greater part of the day; no local deleterious or insanitary conditions; good natural drainage; an easily procured water supply; fine sea bathing. After a personal experience of nine months and the records for eighteen months, my observations upon the local and climatic influence of the place in the treatment of disease is as follows: Acute and chronic dysentery and acute and chronic diarrhea have done perhaps as well here as in any other place in the islands, but no special advantage can be claimed. Subacute and chronic rheumatism have not done well. Cases of incipient or advanced tuberculosis have not improved. Convalescents from the various types of malarial fever, including the anæmias and cachexias, have in a large percentage of cases improved in a marked degree. Convalescents from typhoid and dengue fever have done well. Mild types of sunstroke and heat exhaustion have been much benefited. Cases of climatic debility, brought on by hard and exhausting service in the field, have been restored to normal conditions of health in a short time. This fact is shown in the troops which have been sent here from the field as a guard to the hospital. I would suggest that it might be a good plan to encamp here from time to time troops who require rest and restoration after a campaign in the field.

The following is a brief synopsis of the patients admitted to the hospital from December 1, 1898, to June, 1900: Total number treated, 2,712; returned to duty, 1,946; transferred to United States and other hospitals, 587; died, 28; remaining in hospital, 151.

Of the more important diseases there have been received: Dysentery, acute and chronic, 297; diarrhea, acute and chronic, 310; gastritis, acute and chronic, 79; malarial fever, various types, 630; typhoid fever, 96; rheumatism, acute and chronic, 115; tuberculosis, 6; anæmias and cachexias, 111; and gunshot wounds, 105.

A large majority of the cases have been in various stages of convalescence; others in chronic type of the disease, subject to relapses. Acute cases have been received from the troops stationed on the island and also from the post of Marivales, across the bay.

The medical staff have done faithful and conscientious service.

The female nurses have performed excellent service at this hospital. They have been attentive to their duties, and by their cheerful and kindly manner materially aided in the care of the sick.

The detachment of the hospital corps, with some exceptions, have performed their various duties in a cheerful, conscientious, and intelligent manner.

DEPARTMENT OF NORTHERN LUZON.

Report of Maj. L. M. Maus, Surgeon, United States Army, Chief Surgeon, Second Division, Eighth Army Corps, and of the Department of Northern Luzon, Made to the Chief Surgeon, Division of the Philippines, June 15, 1900.

In compliance with your letter of April 12, 1900, I have the honor to submit herewith my report as chief surgeon, Second Division, Eighth Army Corps, and the Department of Northern Luzon, from December 21, 1899, until assigned to the duties of medical and sanitary inspector, Division of the Philippines, June 8, 1900.

I arrived in Manila December 19, 1899, having sailed from San Francisco on the United States transport *Hancock* the 21st of the preceding month. At date of joining—December 27—the headquarters of the Second Division were located in Bautista, province of Pangasinan, a small nipa pueblo 100 miles north of Manila, on the line of the Manila and Dagupan Railroad. General McArthur, commanding the division, had but a few weeks previously reached this point, during the campaign from Angeles North, and temporarily taken possession of a large frame building constructed by an English company for commercial purposes. Not only did the commanding general and staff live, mess, and have their offices in this building, but the clerical force of the headquarters as well.

COMMAND AND ORGANIZATION OF TROOPS.

Command.—The division contained 6 troops of the Fourth Cavalry, 3 batteries of the Third Artillery, and 13 regiments of regular and volunteer infantry, besides 5 companies of Macabebe scouts, with an aggregate strength of 17,766 officers and men.

The troops occupied at this time 90 posts, and were stationed in the provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Pangasinan, Principe, Tarlac, and Zambales.

Organization of troops.—First Brigade, Col. E. H. Liscum, Ninth Infantry, commanding, consisted of the Ninth and Twelfth Regiments of United States Infantry.

Second Brigade, Brig. Gen. F. D. Grant commanding, consisted of 1 battery of the Third Artillery and the Thirty-second, Thirty-fifth, and Forty-first Regiments of Volunteer Infantry.

Third Brigade, Brig. Gen. Frederick Funston, United States Volunteers, commanding, contained 2 troops of the Fourth Cavalry, the Twenty-second and Twenty-fourth Regiments of United States Infantry, and the Thirty-fourth Regiment of Volunteer Infantry.

Fourth Brigade. This command was organized several weeks later, and placed under the command of Brig. Gen. J. T. Bell, United States Volunteers. Two troops of the Fourth Cavalry, the Thirteenth and Twenty-fifth Regiments of United States Infantry, and the Thirty-sixth Regiment of Volunteer Infantry were assigned to the brigade.

The detachment of United States Engineers, Macabebe scouts, and the Third United States Infantry remained unattached to brigades.

General Orders, No. 1, April 7, 1900, issued by the commanding general Division of the Philippines, by direction of the Secretary of War, organized the military divisions of the archipelago into departments. Hence the brigade and division organizations were abolished and the second division was merged into the Department of Northern Luzon, with a very considerable increase in troops and geographical area. The department was divided into 5 military districts, but later on the sixth district was added. At present the department contains an aggregate strength of 25,550 officers and men, scattered over 226 posts and stations, and embraces in its geographical area 21 provinces.

The following is the present distribution of troops in the department:

FIRST DISTRICT.

[Brig. Gen. Samuel B. M. Young, United States Army.]

Organizations.	Provinces.
Third United States Cavalry (8 troops) Thirty-third Infantry Thirty-fourth Infantry (4 companies) Forty-eighth Infantry Native scouts (400)	Abra. Bantoc. Benguet. Lepanto. Illocos Norte. Illocos Sur. Union.

SECOND DISTRICT.

[Col. Charles C. Hood, Sixteenth United States Infantry.]

Sixteenth United States Infantry Forty-ninth Infantry (8 companies)	Isabela. Cagayan. Nueva Viscaya.

THIRD DISTRICT.

[Brig. Gen. J. F. Bell, United States Volunteers.]

Organization.	Provinces.
Fourth United States Cavalry (4 troops)	Pangasinan. Tarlac. Zambales.
Twelfth United States Infantry	
Thirteenth United States Infantry	
Seventeenth United States Infantry	
Twenty-fifth United States Infantry (8 companies)	
Thirty-sixth Infantry	

FOURTH DISTRICT.

[Brig. Gen. Frederick Funston, United States Volunteers.]

Fourth Cavalry (1 troop)	Nueva Ecija. Pampanga, part.
Twenty-second Infantry	
Twenty-fourth Infantry (8 companies)	
Thirty-fourth Infantry (8 companies)	

FIFTH DISTRICT.

[Brig. Gen. F. D. Grant, United States Volunteers.]

Fourth Cavalry (1 troop)	Bataan. Bulacan. Pampanga, part.
First Artillery (1 battery)	
Third Infantry	
Thirty-second Infantry	
Thirty-fifth Infantry	
Forty-first Infantry	

SIXTH DISTRICT.

[Col. J. Miller Thompson, Forty-second Infantry.]

Fourth Cavalry (1 troop)	Infanta. Manila, north of Pasig. Morong.
Twenty-seventh Infantry	
Forty-second Infantry (8 companies)	

Organization of the medical department of the division.—Active operations against an organized enemy of considerable force had just been closed when I joined the division headquarters at Bautista, and the various regiments were scattered along the line of the Manila and Dagupan Railway as far north as the Gulf of Lingayen. As a matter of fact, I did not expect much in the way of medical organization and administration under these circumstances, owing to the frequent changes required during the recent campaign. Each brigade was supplied with a brigade surgeon, but his office duties were merely nominal. Since the medical department had practically been directed from Manila the changes which were occurring among medical officers and hospital corps personnel were rarely known in the office of the brigade surgeon or chief surgeon of the division until long after the orders were issued and the changes effected. The clerical force of the division surgeon's office at this time consisted of one acting hospital steward, and no records were kept worth mentioning. So far none of the official reports, such as monthly personal reports of medical officers, change of status, reports of sick and wounded, personnel of hospital corps, requisitions, etc., ever passed through the chief surgeon's office, and consequently he knew very little of what was transpiring in his division. All these reports and communications were sent direct to Manila by medical officers, in compliance with a circular order issued by the corps commander upon the recommendation of the chief surgeon of the corps. In like manner many of the special orders effecting changes of medical officers and hospital corps personnel within the division were issued in Manila, and not infrequently intermediate orders were issued by brigade or regimental headquarters affecting the status of these men several times before the corps orders were received. Owing to the irregular sources from which such orders emanated it became impossible for the division surgeon to keep either a roster of the medical officers or the hospital corps personnel, and hence the impossibility of making intelligent recommendations for the proper assignment of either officers or men. On the

28th of December I requested the chief surgeon of the corps to send me a roster of the medical officers on duty in the division, to which he replied that the information was so meager in his office that it was impossible to send anything like a correct list. At this time medical officers and the hospital corps personnel were subject to orders issued not only from Manila, but from brigade commanders, regimental commanders, detachment commanders, by other medical officers, and even at times by the authority of the medical officer himself, and it rarely occurred that an information slip or telegram was sent to the division surgeon announcing these changes. The division commander apparently did not feel authorized to issue orders effecting changes in the status of medical officers in his division on account of the control exercised in Manila, but was very anxious to have the matter properly adjusted. Colonel Greenleaf, the chief surgeon of the corps, recognized the impossibility of arranging these details from Manila and approved of the plan of turning the matter over to the division commander.

Duties of brigade surgeons.—In order to define the functions and prerogatives of brigade surgeons I issued, January 10, 1900, the following circular to them and sent a copy to each medical officer in the division:

"I. Brigade surgeons will keep a roster of medical officers, hospital stewards, acting hospital stewards, privates of the hospital corps, nurses, or other employees of the medical department on duty in their respective brigades.

"II. They will keep the chief surgeon of the division informed by telegraph of any changes affecting the status of medical officers or hospital corps personnel without delay, which information will be transmitted to brigade surgeons by regimental or camp surgeons as soon as such changes occur.

"III. The following reports, etc., will be transmitted to the chief surgeon of the division through the office of the brigade surgeon, viz:

"1. Daily consolidated brigade report of number of sick in quarters, hospital, or absent. When reports can not be obtained for each company in the regiment companies missing should be designated.

"2. Weekly inspection report.

"3. Weekly sick report.

"4. Monthly report of sick and wounded.

"5. Personnel of hospital corps.

"6. Statement of hospital fund.

"7. Monthly report of medical officers, information slips.

"8. List of killed and wounded.

"9. Requisitions for medical and hospital supplies.

"10. Information slips containing all changes in the status of medical officers and personnel of hospital corps.

"11. Telegraphic reports of all deaths belonging to the commands within the brigade.

"12. The monthly sanitary report required by regulations should be referred to the brigade surgeon for his information and action.

"IV. Brigade surgeons are expected to make frequent visits to posts and stations within the limits of their brigades for the purpose of inspection, and will make careful inquiries into the administration of regimental and camp hospitals, treatment of the sick, messing, sanitation, medical and hospital supplies, reports, efficiency of medical officers, personnel of hospital corps, and such other matters as may come under their supervision. Frequent reports with recommendations are desired.

"V. All changes in the duties of medical officers and hospital corps personnel serving in the brigade will be made upon the recommendation of the brigade surgeon, with the approval of the chief surgeon of the division. Where such changes are urgent and the exigencies of the service do not admit of delay, brigade surgeons are authorized to take action at once with the brigade commanders, and report the fact as soon thereafter as practicable.

"VI. Requisitions will be prepared by the regimental surgeons for the entire regiments when practicable and forwarded to the chief surgeon of the division through the brigade surgeons. When necessity demands it, requisitions will be made by wire through the brigade surgeons. Regimental surgeons as a rule should not make requisitions for ordinary medical and hospital supplies oftener than once quarterly."

Owing to frequent changes in the stations of medical officers by brigade, regimental, and post commanders, I requested the division commander to issue an order directing that such changes be only made with the approval of the division commander. Telegraphic instructions were sent to brigade commanders on this subject on January 15, but in spite of these orders changes continued to be made without proper authority. On January 26 an order was issued by the division commander which, except in cases of emergency, limited all changes affecting medical officers and hospital corps personnel to division headquarters.

Regimental and post commanders were in the habit of granting leaves of absence to medical officers for the purpose of visiting Manila, and not infrequently officers granting such leaves would immediately make a requisition on the division commander for another medical officer. Owing to the scarcity of surgeons this practice became so frequent that it became necessary to submit the subject to the division commander, who issued the following order:

"The practice of medical officers leaving their stations without informing the chief surgeon having embarrassed the medical administration of the division, such officers will not in future leave their stations, except on duty, without authority from these headquarters."

With the organization of the department came a large increase in territory and troops. By the time this reorganization had occurred the district surgeons had become fairly well acquainted with their administration duties and were in a position to take entire control of the hospital corps of their respective districts. A letter was written to the department commander, recommending that an order be issued to the effect that all changes of this personnel be made by district commanders on the recommendation of district surgeons. The following order was issued on the subject:

"Upon recommendation of the chief surgeon of the department changes affecting stations of medical officers will only be made by authority of department commander. When the case is urgent and the exigencies of the service do not admit of delay such changes may be made by district, regimental, or post commanders, and the facts reported to these headquarters as soon as possible. It is believed that such urgency orders will not be necessary with troops located at points where telegraphic communications may be had. Orders directing changes in stations of members of the hospital corps within each military district will in future be made by district commanders on the recommendation of the chief surgeon of the district. Since the chief surgeon of the department is held responsible for the proper administration of the medical service of this command, district surgeons are directed to notify him immediately after such changes are made."

This transfer of authority has worked greatly to the advantage of medical administration. It was considered advisable, however, to retain control over the assignments of medical officers in the department.

Regimental surgeons.—Three regimental surgeons, one surgeon with the rank of major, one assistant surgeon with the rank of captain, and one assistant surgeon with the rank of first lieutenant, were included in the organization of each volunteer regiment, but curiously enough, in spite of his rank, the captain was only allowed the pay of the first lieutenant. About one-half of the surgeons of the volunteer regiments were selected from the ranking assistant surgeons of the Regular Army. The same regimental organization was applied to the regular regiments in the division except that the regimental surgeons were taken from the junior assistant surgeons of the Army, and in many instances from the acting assistant surgeons. The colonels and other officers of the regular regiments made frequent complaints as to the invidious distinction of selection of medical officers for regular and volunteers. In accordance with instructions received from the chief surgeon of the corps, the regimental surgeon was directed to make out the monthly report of sick and wounded for the entire regiment, the personnel of the hospital corps, muster rolls for the entire regimental detachment, supply hospital and medical supplies, carry all the hospital property on his papers, etc., which was an impossibility in the majority of cases separated and detached, as most of the companies in each regiment were. Very soon the allowance of regimental surgeons for each regiment became inadequate, owing to the number of posts garrisoned and their distance apart. In a number of instances medical officers had to attend from three to four different stations, varying from 4 to 10 miles apart, and owing to the hostile condition of the country it became necessary for them to take a guard, or run the risk of being shot or boloed. The scarcity of medical officers made the medical administration difficult and unsatisfactory, and resulted in many complaints from line officers. As it was impossible to obtain a sufficient number of surgeons, it became necessary to assign intelligent noncommissioned officers or privates of the hospital corps to these stations. In one instance seven medical officers were assigned to one regiment and still others were needed with it. A very large proportion of the medical officers serving in the division were acting assistant surgeons who evidently had come over for the novelty of the trip. Many of them became tired of their contracts and under various pretexts sought to be sent home. A number became unfit for duty on account of sickness and had to be returned to the States. One acting assistant surgeon, finding that he could not get away honorably, deserted the service. I refer to Dr. Roger T. Atkinson, who was stationed at Abucay. The majority of the medical officers on duty in the division were young and inexperienced. This remark applies to the acting assistant surgeons as well as those belonging to the volunteers and regular corps. I think the service suffered very much on this account. After regiments had become broken up into eight or a dozen posts it practically became impossible for the regimental surgeon to carry out instructions in regard to monthly reports, etc., for the entire regiment. The following circular was therefore issued February 6, 1900:

"I. Regimental surgeons are no longer required to submit the monthly report of sick and wounded for the entire regiment when companies are serving at different stations. The senior medical officer at each station will submit this report in accordance with existing regulations from the Surgeon-General's Office as printed on inside cover of register for patients. This report will be forwarded direct through the brigade surgeon to this office not later than the 5th of each month. Brigade surgeons will see that they are properly corrected before being transmitted. Reports for regulars and volunteers to be made out separately.

"II. Reports from troops where no medical officer is serving will be prepared by the medical officer having indirect charge. Hospital stewards, acting hospital stewards, or privates having charge of such stations should be provided with blank books for making out the daily sick report, and instructed as far as possible in the detail of preparing the necessary data for the medical officer responsible for the report.

"III. The reports of personnel of the hospital corps will also be prepared and forwarded from each station, where medical officers are serving, direct to this office through brigade surgeons. At stations where no medical officers are serving this report will be made out and forwarded by the medical officer having indirect charge of the station.

"IV. Brigade surgeons will also submit the monthly report of sick and wounded for headquarters of brigade and personnel report for members of the hospital corps serving in their office."

Instructions were also given regimental surgeons in regard to muster rolls for their detachments, and they were authorized to have rolls prepared for each station if deemed advisable. The regimental surgeon was required by a circular issued from corps headquarters to carry all the nonexpendable property issued for use of his regiment on his returns. The complications arising from this ruling frequently led to much dissatisfaction and seemed to a certain extent unjust. In many instances the regimental surgeon had to take up property he had never seen and to account for it, although it had been stolen, lost, or destroyed while not in his possession. In the organization of the various camp hospitals, equipment was sent direct from the supply depot without passing through the hands of the regimental surgeon. After a thorough study, both in garrison and field, I have become thoroughly satisfied that the regimental system of medical officers, generally speaking, is a failure. Whether he serves with volunteers or regulars, the medical officer should belong to the general medical staff, and be so situated that he could be relieved and sent elsewhere should the occasion require it. This should also apply to the hospital corps detachment attached to a regiment. Under the ruling the hospital corps detachment attached to a regiment is supposed to belong to it for the time being and follow the regiment under all circumstances. The constant changes in the personnel of camp hospitals, as a result of this system, worked to the detriment of the medical administration and the care of the sick. During the changes, which were frequently occurring among troops, companies leaving pueblos and replaced by others of different regiments would not only rob the camp hospitals of the personnel, but also dismantle them and carry off all the supplies and equipment. In order to break up this system, I requested the department commander to issue an order to the effect that during such changes the hospital personnel and equipment be left undisturbed, except when authorized to do otherwise by instructions from department headquarters.

Regimental and camp hospitals.—In addition to the regimental hospital organized at the headquarters of the regiment, it became necessary to organize a small hospital for the use of each separate station, except in the case of very small detachments. Medical officers were directed to organize such temporary hospitals in nipa houses or other buildings conveniently located, after a thorough cleansing and disinfection. From 5 to 10 field cots were issued for this purpose, and in many instances these hospitals were equipped with native beds and furniture. In every pueblo suitable buildings were found large enough to accommodate 50 beds if necessary. For all patients in such hospitals a gratuity of 30 cents, Mexican, was allowed from the civil fund in addition to the ration. Medical officers were directed to transfer all serious cases from the regimental and camp hospitals to the permanent field and base hospitals established within the division. Typhoid and malarial fevers, chronic dysentery, chronic diarrhea, and surgical cases requiring special skill were included in this list. Before these camp hospitals were established a large number of all the cases appearing on sick report were sent to the division hospitals or to Manila, and, consequently, many of these large hospitals were overcrowded with mild cases. These camp hospitals also reduced very greatly the percentage of sickness in the division. A large number of the cases were really not serious enough for transfer to the permanent hospitals, a rest of a few days in camp hospitals on a proper diet being all that was necessary in such cases. It is believed that men sent to Manila, or the permanent hospitals, remained on sick report much longer than necessary in many instances, and in this way kept up the percentage of sick.

Field and base hospitals.—The division hospital was established in the cathedral at Angeles by First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, September 29, 1899, and has a capacity of 260 beds. The main floor of the church is divided into four aisles, each of which has been converted into a ward. This hospital receives patients from troops stationed south of Angeles, and generally contains from 140 to 160 cases. The pueblo of Angeles is located in a sandy country about 90 feet above the level of the sea and is regarded as a very healthy section of the country. It is located on the railroad running from Manila to Dagupan and is thus favorably situated for the transportation of the sick. The nursing in the hospital is entirely done by members of the hospital corps, which has proven as satisfactory as in other hospitals employing trained female nurses. Lieutenant Fauntleroy is a very capable and painstaking officer, and possesses a high order of executive ability. He deserves great credit for the successful manner in which he has administered this hospital. In addition to his duties with the division hospital, he also is medical supply officer of the department, the depot being located at present in Angeles. Since the department headquarters were removed to Manila, orders have been issued transferring the depot here.

Base hospital, Dagupan.—As a result of General Wheaton's expedition north and campaign through the province of Pangasinan, it became necessary to establish a base hospital at Dagupan. A large building constructed by the Dominican Friars and used for college purposes, was selected for this purpose. This building is located on a tongue of land surrounded on one side by an arm of the sea and the other by a series of salt beds flooded by the ocean and is admirably arranged for hospital purposes. It has a capacity for 375 patients, besides rooms for dispensary offices, stores, diet kitchens, and a large corridor for mess hall. The hospital was established during the month of December, 1899, but was not thoroughly equipped before the 1st of February, 1900. The locality of this hospital makes it a very valuable place for the treatment of malarial and intestinal affections.

Brigade hospitals.—In additon to the division and base hospitals, a hospital for the First Brigade had been established at Tarlac, and one for the Third Brigade at San Isidro. On joining the division I found the First Brigade hospital had degenerated into a regimental hospital for the Ninth Infantry. On an inspection tour made to Tarlac, January 2, I found 49 patients in this hospital, 47 of whom belonged to the Ninth Infantry stationed in that and neighboring pueblos. This hospital was continued as the regimental hospital of the Ninth Infantry; the building which it occupied, the pueblo Presidencia, was well suited for hospital purposes, and was capable of accommodating 80 beds. The Third Brigade hospital at San Isidro, now officially known as the Fourth District hospital, occupies a large building in the center of the town and has a capacity of 75 beds. This hospital was originally established by General Lawton for the First Division during his expedition through Baliuag. At present it serves an excellent purpose for use of troops in San Isidro and those stationed in towns along the Rio Grande de Pampanga.

Division supply depot.—Until February requisitions for medical and hospital supplies were sent direct from regimental surgeons to the chief surgeon of the corps for issue from Manila. About this time so much work had accumulated on the hands of the supply officer in Manila that it became impossible to have requisitions filled with the necessary dispatch in cases of emergency. With the consent of Colonel Greenleaf, I established a medical supply depot for the division in the convent adjoining the division hospital at Angeles. Lieutenant Fauntleroy, the commanding officer of the hospital, was placed in charge. The building selected contained a number of rooms on the ground floor which rendered it specially suitable for depot purposes. Ample requisitions were made on the main depot in Manila, and from about the middle of February the medical officers of the division were supplied from Angeles. Regimental surgeons were directed to forward their requisitions for supplies for the entire regiment quarterly, except when it became necessary to submit specials; they were also authorized to use the wire when necessary. Regimental surgeons, when practicable, drew and issued supplies to the other posts of the regiment, and carried the nonexpendable property on their papers. Owing to the location of portions of the regiment this method could not be carried out, and the medical officers in charge of such troops were authorized to submit their own requisitions. Under these circumstances the medical officers drawing such supplies became responsible for them, it being impossible for the regimental surgeon to do so. On account of the press of work in the medical supply depot at Manila, the chief surgeon of the corps did not require medical officers receiving supplies to receipt for the expendable articles. This reduced the clerical work very materially. This same system was carried out in the division supply depot. Owing to the regimental system of receipting for medical supplies, Lieutenant Fauntleroy experienced considerable difficulty in obtaining receipts for supplies issued direct to medical officers serving with companies detached from regimental headquarters, and it became necessary to issue a circular on this subject. The medical officer receiving such property was required to send a memorandum receipt of it to the regimental surgeon, and in that way the matter was arranged. Since the department headquarters have been removed to Manila, steps have been taken to remove the department supply depot here also. Owing to the enormous seacoast occupied by troops of this department, and the water transportation necessary, Angeles is no longer a suitable place for this depot.

Division ambulance company.—An ambulance company had been organized for the division during the fall and before the command had begun its campaign north. This company was made up of 6 ambulances, a number of caraboa carts, litters, and a hospital personnel of 1 hospital steward, 2 acting stewards, and 40 privates. The company was under command of Acting Asst. Surg. A. B. Smith, and stationed at Tarlac when I joined the division. I understand it did excellent service in removing the sick and wounded along the line of march during the fall campaign. As there was no further use for such an organization, the troops being divided into one and two company garrisons, this company was disbanded early in January, the ambulances, personnel, etc., being assigned elsewhere.

Buildings occupied by troops, camp sanitation, etc.—Owing to the hostile condition of the country and the facilities offered for harboring insurrectos, ladrones, etc., the division commander decided to garrison all the principal pueblos in the limits of the division; hence each regiment was required to cover from six to twelve stations. The majority of the pueblos contain a church and convent, and this property as a rule was taken for the use of the troops, the friars having left the country during the insurrection. Private residences constructed of hard wood or nipa houses were occupied in towns where convents did not exist, and as a rule the troops were well and comfortably housed. A suitable building was also selected for the camp hospital. The sanitation of the towns was extremely bad when our troops entered them. The habitations of the natives as a rule were surrounded by filth of all kinds—slops, garbage, fecal accumulations, rubbish, and other débris. Weeds and rank vegetation were allowed to grow along the fences, in the yards, and in the streets. The native privy consists of a small bamboo house, erected about 5 feet from the ground and located in the yard, and connected with the main house by a bamboo bridge. The deposits as they drop are disposed of by the Filipino hog, the scavenger of the island, who usually remains around during the morning hours. Where this arrangement does not exist, the fecal matter is deposited amongst the weeds in the vicinity of the house. The slops and garbage as a rule were thrown to the hogs outside of the door or beneath the house through the open bamboo floor. Each family generally possesses a well, located near the kitchen door and not over 5 or 10 feet deep, the exception being to find them walled. Smallpox was prevalent in nearly every pueblo in the division, and it is questionable whether any house could be found which was not more or less infected. No attempt was made at isolation or disinfection by the natives, and the funerals of those dying of the disease were public in every sense from house to church and cemetery. Under these circumstances it became necessary to take unusual precautions with our troops. Stringent orders in regard to the boiling and filtering of drinking water, disposal of garbage and night soil were issued by the division commander. Post commanders were required to consult with the town presidents and counselors in regard to the sanitary conditions of the towns, and a great reformation was accomplished in this direction. As soon as possible the dry-earth system was introduced throughout the division, the closets being supplied by the quartermaster's department.

Smallpox and public vaccination.—Owing to the prevalence of this disease the following letter was written to the division commander, which resulted in an order for the public vaccination of natives within the limits of the division:

HEADQUARTERS SECOND DIVISION EIGHTH ARMY CORPS,
CHIEF SURGEON'S OFFICE,
Bautista, P. I., February 30, 1900.

SIR: I have the honor to state that smallpox is more or less prevalent in every town within the limits of this division, and not rare among our troops as a consequence. I do not believe it possible to stamp out this disease among our soldiers, in spite of the frequent and careful vaccinations practiced among them, until the natives are themselves protected. Owing to the continuous state of warfare that has existed on these islands for some years past, systematic vaccinations have been neglected among the natives, and hence the prevalency of this disease. Medical officers stationed in many of these towns report serious epidemics of this disease, and have been supplied with virus for use among natives in small quantities. While many officers are willing to perform this additional duty, not only for the protection of the men under their charge, but also from motives of humanity, it would seem wise for the military authorities to take this matter under consideration without delay. The natives in many instances are anxious for vaccination and frequently apply to medical officers along the line of railroad and also from interior towns. A systematic and compulsory system of vaccination should be required as far as it is possible within the territory now under our control. It is also believed that arrangements could be made to have these vaccinations performed all over the islands. When the work can not be performed under the direction of the medical officers, in towns where troops are stationed, the services of practicantes can be secured for from $15 to $25, Mexican, per month. The virus and expense of vaccination should be charged to the United States or to civil funds.

L. M. MAUS,
Major and Surgeon, U. S. Army, Chief Surgeon.

The ADJUTANT-GENERAL SECOND DIVISION, EIGHTH ARMY CORPS.

This communication received the hearty approval of General MacArthur, the division commander, and the chief surgeon of the corps. I was directed by the corps commander to institute as quickly as possible a system for the protection of the natives of the division, which was to be paid for out of the civil funds. Although our men had been frequently vaccinated, numerous cases of smallpox were reported from day to day among them, and not infrequently a number of deaths. It is my opinion that before the public vaccinations were instituted as many as forty or fifty cases of smallpox were being daily treated in the division among the troops, while in some of the towns the disease was practically epidemic among the natives and deaths very common. Circular letters of instruction were written to brigade surgeons, as well as to medical officers, in regard to the matter of procedure, etc. They were authorized to hire native vaccinators at $30 Mexican per month and inspectors at the rate of $40. No limit was placed on the number of vaccinators for each pueblo, this depending on the amount of work required. Virus was furnished in abundance on telegraphic requisitions to the board of health, Manila. The following circular was sent February 17, 1900, to all medical officers in the division:

"I. Medical officers on duty in this division are directed to superintend the vaccination of natives in towns where troops are stationed, and are also expected to exercise control over towns and barrios in their respective neighborhoods. They will confer with the city authorities in the regard to the selection of a suitable place for these vaccinations and best method for gathering the inhabitants together for this purpose. Medical officers are specially cautioned in regard to proper instructions for cleansing arms, instruments, and performing the operations. Soap, nailbrushes, bichloride tablets, gauze, and blank books should be provided vaccinators. These articles can be secured from Manila on properly prepared requisitions, the cost of which is defrayed by the civil fund. Before vaccination the arm should be thoroughly washed with soap and scrubbed with a nailbrush, afterwards rinsed in boiling water. In case an antiseptic solution is used, care should be observed that it is carefully washed off before the operation. The arm should be left uncovered at least thirty minutes after vaccination, until it becomes dry and glazed over. The process of vaccination of large numbers may be greatly facilitated by systematizing the work—that is, assigning a certain portion of the work to each individual; for instance, one for washing arms, a second for preparing the spot for vaccination, and a third for inserting the lymph. A fourth person should be employed for keeping the records of those vaccinated. A record of every case will be kept and records forwarded to this office after completion of work."

The vaccinators were paid on rolls forwarded to the division supply officer, who had charge of the disbursement of the civil funds for vaccination and purchase of drugs for indigent natives. In order to lend official sanction to this work and secure the cooperation of the commanding officers in the various pueblos, the following order was issued from division headquarters:

GENERAL ORDERS, }
No. 15. }

HEADQUARTERS SECOND DIVISION
EIGHTH ARMY CORPS,
Bautista, P. I., February 17, 1900.

1. The work of vaccinating the native population within the limits of this division being now in progress under the supervision of the chief surgeon, commanding officers

will cooperate with the medical department and render all assistance possible in the prosecution of the work.

By command of Major-General MacArthur:

BENJAMIN ALVORD,
Assistant Adjutant-General.

The work of public vaccinations was fairly started February 20 and was industriously pushed by the medical officers in charge. The board of health, Manila, usually kept an abundance of fresh virus on hand and responded promptly to requisitions for it. There was very little objection on the part of the natives, probably no more than would have occurred among the same number of Americans. The insurgents objected to these public vaccinations in several of the pueblos, manifesting their disapproval by kidnapping the vaccinators.

District surgeons are required to render a report of work done in their respective districts after the completion of the work. The work is still going on, but the following reports show what was accomplished in each district from February 20 until May 31.

The first and second districts were not attached to the division until it was merged into a department in April, and owing to the poor mail facilities and uncertain transportation of virus little was accomplished in these districts before I was relieved as chief surgeon. Much of the virus sent to them became inert before it reached its destination.

	Third district.	Fourth district.	Fifth district.
Estimated population	337,363	121,400	330,612
Estimated number protected by smallpox	171,788	25,718	78,069
Estimated number protected by previous vaccinations	13,853	12,177	109,112
Children vaccinated	62,609	19,224	31,173
Adults vaccinated	41,301	14,851	27,222
Successful vaccinations	72,291	15,055	20,216
Total vaccinations	114,051	34,075	58,253
Number that require vaccination	50,635	68,450	113,796
Number of vaccinators employed	127	31	68
Number of units virus used	152,700	31,000	42,000

Hospital cars.—As the army advanced north the Manila and Dagupan Railroad was rehabilitated, and proved invaluable not only for the transportation of troops and supplies, but for the sick and wounded of the division as well. Ordinary freight cars provided with mattresses, blankets, pillows, etc., were first utilized for this purpose, but upon proper representation to the corps commander authority was obtained to fit up two long freight cars for hospital purposes. The division hospital was located at Angeles, 50 miles north of Manila, and all patients south of that point were sent to the division hospital. The base hospital at Dagupan, 70 miles farther north, received all patients north of Angeles. The hospital cars were fitted up with eight superimposed woven-wire bottom berths, racks for medical and surgical supplies, ice box for preserving milk and other foods, and a water-closet. Each car was provided with one acting steward and two privates, one of whom was a supernumerary. These cars made daily trips between Manila and Dagupan and served a most useful purpose. The following letter was embodied in an order by the department commander and issued as hospital car regulations:

HEADQUARTERS SECOND DIVISION EIGHTH ARMY CORPS,
CHIEF SURGEON'S OFFICE,
Bautista, P. I., April 18, 1900.

SIR: In order to more properly organize the hospital railway service for this department, I have the honor to recommend that a circular letter of instruction embodying the following rules and regulations be published for the information and guidance of all concerned:

1. The railway service in connection with the transportation of the sick and wounded will be under charge of the chief surgeon of the department and subject to his instructions.

2. The personnel of each hospital car will consist of one acting hospital steward and two privates of the hospital corps, one of whom shall be a supernumerary. They will be attached to the department hospital at Angeles for muster, pay, clothing, etc., and will be carried on the rolls of that hospital. When relieved from temporary or permanent duty with the hospital car service they will report to the commanding officer there for duty.

3. The acting hospital steward, or senior private, present in charge will be held responsible for the proper administration of this service and the care of the sick during transfer to their destination. He will keep a daily report, in a blank book provided for this purpose, of every one transferred, stating name, rank, company, regiment, corps, diagnosis, and place of destination. Where casuals are transferred without transfer slips, the cause, as far as possible, will be noted in the report. A copy of this report of each day will be transmitted to the chief surgeon of the department.

4. A daily inspection of the hospital car service will be made by a medical officer belonging to the staff of the department hospital at Angeles, under the directions of the commanding officer. He will examine into the condition of the service, see that the medical supplies and equipment of each car are properly maintained, report necessary repairs to cars, and make such recommendations as may be necessary for changes in the personnel.

5. No person will be permitted to travel on the hospital cars except the attendants and the authorized sick. Officers or soldiers taken sick en route, or found along the line, should be transferred in hospital cars, though having no transfer slips. The name of any officer, soldier, or citizen violating this regulation will be reported to the chief surgeon of the department.

6. Except medical supplies in small quantities for emergency use, and ice for hospitals, no articles will be shipped in hospital cars.

L. M. MAUS,
Major and Surgeon, U. S. Army, Chief Surgeon.

The ADJUTANT-GENERAL, SECOND DIVISION EIGHTH ARMY CORPS.

Public distribution of medicines to indigent natives—free dispensaries.—As a result of the recent wars, a large proportion of the natives had become impoverished, run down in health, and greatly in need of medicines. Practically no practitioners of medicine could be found in the country, and very few drug stores. Pernicious malarial fever was not uncommon among them, and deaths from that cause not infrequent. The only quinine available in the country was that supplied to the troops. In the pueblo of Mexico, province of Pampanga, twelve natives died from pernicious malarial fever in one week. Fifty ounces of quinine were sent there for distribution in charge of a medical officer, and the medicine dispensed on the main plaza. The judicious use of this medicine, together with a thorough overhauling of the sanitary condition of the city, relieved the situation. The condition of the people in this respect was represented to the division commander, and $20,000 Mexican requested to purchase medicines for the indigent poor. The application was approved and the money was turned over to the division supply officer. A supply of quinine, vaseline, carbolic acid, gauze bandages, bismuth, etc., was sent to sixty-six pueblos, and by these means great good was accomplished.

Prevailing diseases.—Malarial fever and intestinal diseases comprise about 60 per cent of all the diseases occurring on the island of Luzon. The malarial parasite is probably responsible for at least one-half of all the sickness, while next in order are diarrhea and gastric disorders. Dysentery is also common, but not so frequent as diarrhea; perhaps 25 per cent of the dysenteries are of the amœbic variety. Dhobie itch (tinea circinata) is not as common as generally supposed. Smallpox is very common among the natives, and while quite fatal, appears not to be dreaded. I think that 50 per cent of the living population have had the disease. Leprosy is widely scattered over the archipelago, an estimate of 30,000 cases having been made on good statistical authority. Beriberi is frequent during the rainy season. Catarrhal diseases are also quite common, especially chronic inflammation of the nose, throat, and bronchial tubes. Pulmonary tuberculosis is also a widespread disease among the natives.

The large percentage of malarial fevers and intestinal diseases contracted by the troops was due to numerous "hikes" after insurrectos and ladrones under the most unfavorable hygienic conditions. While on these trips the men waded through swampsand flooded rice fields, drank water from all sources, ate poorly prepared food, and slept in wet clothes. They were also exposed at times to the sun's rays during the heat of the day. These conditions will in all probability not occur again, and if so, will be confined to only a small per cent of the troops, hence the general average of the mens' health should be better in the future. From my experience with troops that have been stationed here under favorable conditions, and with good hygienic surroundings, I am satisfied that a high standard of health can be maintained among them. During the acclimatizing process everyone is liable to lose his superfluous flesh, but that is rather an advantage. When proper barracks and living facilities are prepared in the Philippines for our troops and their duty is confined to garrison life, I feel quite sure that the sick rate will be no higher than at stations in the southern part of the United States.

Rations.—The Government ration as issued by the Subsistence Department appears to be adequate and well adapted for the needs of our troops in the Tropics. Much has been written on this subject, and by many of these theoretical writers a dietary prescribed similar to that in use by the inhabitants of the country. In the discussion of this question several important factors must be considered. First, that the physical condition of the American soldier differs in every respect from that of the Filipino, Cuban, or Porto Rican, and consequently his physical wants are equally different. Four centuries have cultivated a taste in the Filipino for rice and the omnipresent mud fish; time has so molded the palate of the Mexican that he craves and digests with ease tortillas, frijoles, and chili, while the Cubans and Porto Ricans are wedded to their food—yams, rice, etc. The stomachs of these various races are accustomed to the food they have received for generations and readily take care of it. Put an American on the diet of any of these tropical countries, and in less than a week his stomach will be gone. Our ration is excellent and in the main should be left undisturbed. Some slight changes might be made in regard to the reduction of the fats and increase of the saccharin element. The fresh beef and mutton sent here as a rule comes from Australia, and is issued to the troops in the interior hundreds of miles from Manila in a semifrozen condition. It is always received in an excellent condition and is of a fine quality. Cocoa, chocolate, and tea are adapted to the Tropics, and the men crave sweets, such as jams, preserves, dried fruit, and candy. Sugar promotes health if taken in reasonable quantities, and creates vital energy. Great stress should be laid on the preparation of food, and each company should be supplied with two accomplished cooks.

Clothing for the troops in the Tropics.—As the change in temperature during the year undergoes slight variation, no change in weight or texture should be made in the clothing for the different seasons. The material employed in the manufacture of the blouse, trousers, and underwear should consist of cotton, linen, or a mixture of the two, and of a light texture. Lightness, strength, durability, and color are the four requisites in the manufacture of a uniform for the Tropics. Woolen garments, pure or mixed, may be regarded as unnecessary in a climate where the temperature rarely goes lower than 75° F. during the coldest season of the year. Wool is rarely worn here either by natives or acclimated foreigners. The khaki cloth issued by the Quartermaster's Department is too heavy and dense for comfort. It is woven into a heavy drilling which entirely precludes the passage of air. The felt hat is also too heavy for comfort and should be superseded by straw. The drab felt hat, as now manufactured, retains too much heat and prevents the necessary circulation of air around the temples. Canvas-top shoes, with leather soles and heels, would be an improvement over the leather in the dry season. Rubber boots would be serviceable for guards, etc., during the rainy season, and a mackintosh in place of a poncho. A reform in the color of the tropical uniform is one of the most desired changes. A composite shade of green would be infinitely better in every respect. This color, from a military standpoint, is superior to the khaki of the English, which we have adopted, or the blue and white of the Spaniards. Such a shade of green would absorb less heat and would certainly be less conspicuous on the firing line. The shade desired is obtained by blending green with a russet brown. The material might be woven of an alternate green and russet brown thread, or a composite shade made up by a blend of the two. The entire islands are covered with a dense vegetation at all seasons of the year, consisting of palms, bamboo, banana shrubs, grass, and dense hedges with every variety of green shades. Protective mimicry in nature among birds and animals is so well known by natural historians that it is scarcely necessary to discuss it here, but a valuable suggestion lies behind this truth, which if acted upon would no doubt work to the material advantage, comfort, and safety of our troops. In addition to the natural advantages already mentioned in connection with this subject, it would not be amiss to state that such a shade of green would prove exceedingly handsome and agreeable to the eye, and by its adoption would possess the sentimental attractiveness of being a national uniform color, which the khaki can never possess, from the fact that it is essentially English, and should be left to their quiet and undisturbed possession.

Monthly medical reports, clerical work, etc.—Great difficulty was experienced in securing the monthly official reports on account of the inexperience of medical officers and the scarcity of experienced hospital and acting stewards. Very little was expected of these officers under the circumstances, and the tardy appearance of the incorrect reports which were finally received caused no surprise in my office. Except in the case of one officer, every report of sick and wounded had to be returned for corrections. It became impossible for the regimental surgeons to render a report for the entire regiment on account of the widely separated companies. Each camp surgeon was required to render the monthly report for the troops he attended, and as he in numerous cases had charge of three or four stations, some of which he could not visit oftener than once a week, he had to make up some of these reports from data and information furnished by the hospital private in charge. The following is a copy of the usual daily report furnished the department commander, a copy of which was also sent to the corps surgeon:

Daily field report of sick and wounded, Department of Northern Luzon.

Organization.	Strength reported.	In quarters.	In hospital.	Absent.
Engineer Corps	Detachment	(1)	(1)	(1)
Third Cavalry	8 troops	42	38	4
Fourth Cavalry	6 troops	30	17	62
First Artillery	1 battery	3	0	15
Third Infantry	Regiment	40	20	51
Ninth Infantry	do	41	14	138
Twelfth Infantry	do	33	24	105
Thirteenth Infantry	do	30	23	95
Sixteenth Infantry	do	40	66	54
Seventeenth Infantry	do	26	23	104
Twenty-second Infantry	do	48	10	101
Twenty-fourth Infantry	4 companies	16	10	22
Twenty-fifth Infantry	Regiment	26	25	43
Twenty-seventh Infantry	do	56	21	66
Twenty-ninth Infantry	5 companies	16	0	73
Thirty-second Infantry	Regiment	30	20	83
Thirty-third Infantry	do	34	61	13
Thirty-fourth Infantry	8 companies	28	22	12
Thirty-fifth Infantry	Regiment	26	40	51
Thirty-sixth Infantry	do	24	34	24
Forty-first Infantry	do	34	42	31
Forty-second Infantry	do	19	7	114
Forty-eighth Infantry	1 company	5	10	7
Forty-ninth Infantry	3 companies	8	10	0
Macabebe scouts		5	0	1
Native scouts		5	6	3
Burr's scouts		1	3	0
Total		666	546	1,272

[1] No report received.

Department field hospital, Angeles	134
Department base hospital, Dagupan	264
Fourth district field hospital, San Isidro	54
	452

Deaths: Private Clarence Quillion, Company E, Thirty-fifth Infantry, gunshot wound, abdomen.
Private Lewis F. King, Company E, Thirteenth Infantry, sunstroke.

Special mention of medical officers and members of the hospital corps for gallantry during action or for meritorious service.—I have no special official information concerning the gallant conduct of many of the medical officers of the division during the preceding summer and fall. Many of them were present during numerous sharp engagements and performed conspicuously gallant service in the relief of the wounded on the firing line. I understand that these officers have been specially mentioned by their respective commanding officers. Maj. Franklin A. Meacham, surgeon, United States Volunteers, deserves special mention for the zeal, energy, and ability displayed in the administration of his brigade and district. First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, deserves great credit for the successful administration of the Second Division Hospital and supply depot. The following letter was received from Maj. G. W. Penrose, brigade surgeon, United States Volunteers, in regard to Acting Assistant Surgeon Reifsnyder, dated January 18, 1900:

"I have the honor to make the following report: As I wired you yesterday, Acting Assistant Surgeon Reifsnyder reported here with 49 sick of the Twenty-second Infantry en route to San Fernando. This officer has been steadily in the field since last October, he has been cut off from all supplies, has had to subsist his sick on the country and trust to native leaves and roots for medicines. All his sick had to be carried in hammocks by natives. In spite of every difficulty he brought them through in splendid shape. Most all of the men will be ready for duty in a few days. I most strictly commend the zeal and professional ability of this officer to the attention of the chief surgeon, believing him worthy of special mention."

Acting Hospital Steward Frederick W. Boschen for gallantry and efficiency in the performance of his duties during the battles at Bagbag, San Fernando, Angeles, Bamban, and other engagements during the march of the division north; also for his clerical work as chief clerk to the chief surgeon of the division. Acting Hospital Steward William Vogt for gallantry and efficiency in the performance of duty during the actions at Taytay, Paranaque, San Fernando, Angeles, Bamban, and for his clerical ability in the office of the chief surgeon of the division. Acting Hospital Steward Angus Peete for his efficient clerical work in the office of the chief surgeon of the division. I invite attention to the list given by the chief surgeon of the Fifth district in his report. (See p. 146.)

On my assignment to the division as chief surgeon December 21, 1900, it contained 17,766 officers and enlisted men, 91 posts and 51 medical officers, 16 hospital stewards (regular and volunteer), 15 acting hospital stewards, and 261 privates. When relieved, June 8, 1900, the department contained 25,550 officers and enlisted men, 226 posts, 124 medical officers, 30 hospital stewards (regular and volunteer), 65 acting hospital stewards, and 762 privates of the hospital corps.

REPORT OF LIEUT. P. C. FAUNTLEROY, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE SECOND DIVISION HOSPITAL AT ANGELES, PAMPANGA, LUZON, MADE JUNE 1, 1900, TO THE CHIEF SURGEON, DEPARTMENT OF NORTHERN LUZON.

In compliance with instructions in letter, chief surgeon's office, Department of Northern Luzon, dated Bautista, P. I., May 4, 1900, I have the honor to submit the following report, accompanied by photographs of this hospital, from January 1, 1900, to May 31, 1900:

The hospital, since September 29, 1899, has been located in the cathedral and its adjoining buildings at Angeles, P. I. The cathedral is built in a large open square, fronting on a road running east and west, and situated on the southern boundary of the town, about 1¼ miles south of the railroad depot. The walls and belfry towers are built of artificial stone. The roof, together with the large dome situated on the rear end, is of corrugated iron. The interior is about 100 feet wide and 200 feet in length, divided into three aisles by a row of large pillars on either side of the center aisle, which is about 50 feet in width. The altar is about 4 feet above and occupies the last 30 feet of the main floor, extending the entire width of the interior. In rear of the altar is a large vestry with two adjoining rooms. The floor of the main entrance, side aisles, altar, vestry, and all rooms is of tiling; that of the center aisle is of hard wood. The ceiling of the center aisle is an arch of redwood springing from the top of the large pillars, which are about 25 feet high, and rising to a height of 40 feet above the floor. The interior is always cool in the hottest weather, and very dry in the wet season. The dispensary is located in one of the rooms on either side of the main entrance; the officer of the day occupies the other. The aisles form the medical wards Nos. 1, 2, and 3, respectively; the altar, the surgical ward, together with a small ward for officers; the capacity of each of the wards being about 65 beds. The vestry was utilized for the main operating room, one of the side rooms being used for minor surgery and dressing room. The location and size of the operating room permitted the wounded, during the active operations of the Army and at other times for cases requiring surgical operations, to be brought in and operated on without disturbing the other patients—a very important feature when there were many wounded to be cared for at the same time. An isolation ward of bamboo was built 100 yards to the west and rear of the cathedral. Running east and west about 30 feet from the cathedral is a thick hedge of very tall bamboo which affords shade and protection from the winds continually blowing over the wet rice and cane fields on the other side of the bamboo. On the east side the laundry, stable, and patients' rear are located; on the south, behind the bamboo hedge, the rears for officers and hospital corps, respectively, and on the west the mess halls for patients and hospital corps, the kitchen and bath houses. In the large house extending the front of the cathedral to the west there were sleeping apartments and numerous rooms, which furnished quarters for the medical staff and part of the hospital corps. The rooms on the ground floor were used for subsistence store rooms, record office, and medical supply depot for the Department of Northern Luzon. On the west side of this house two acres were fenced in and the hospital garden planted.

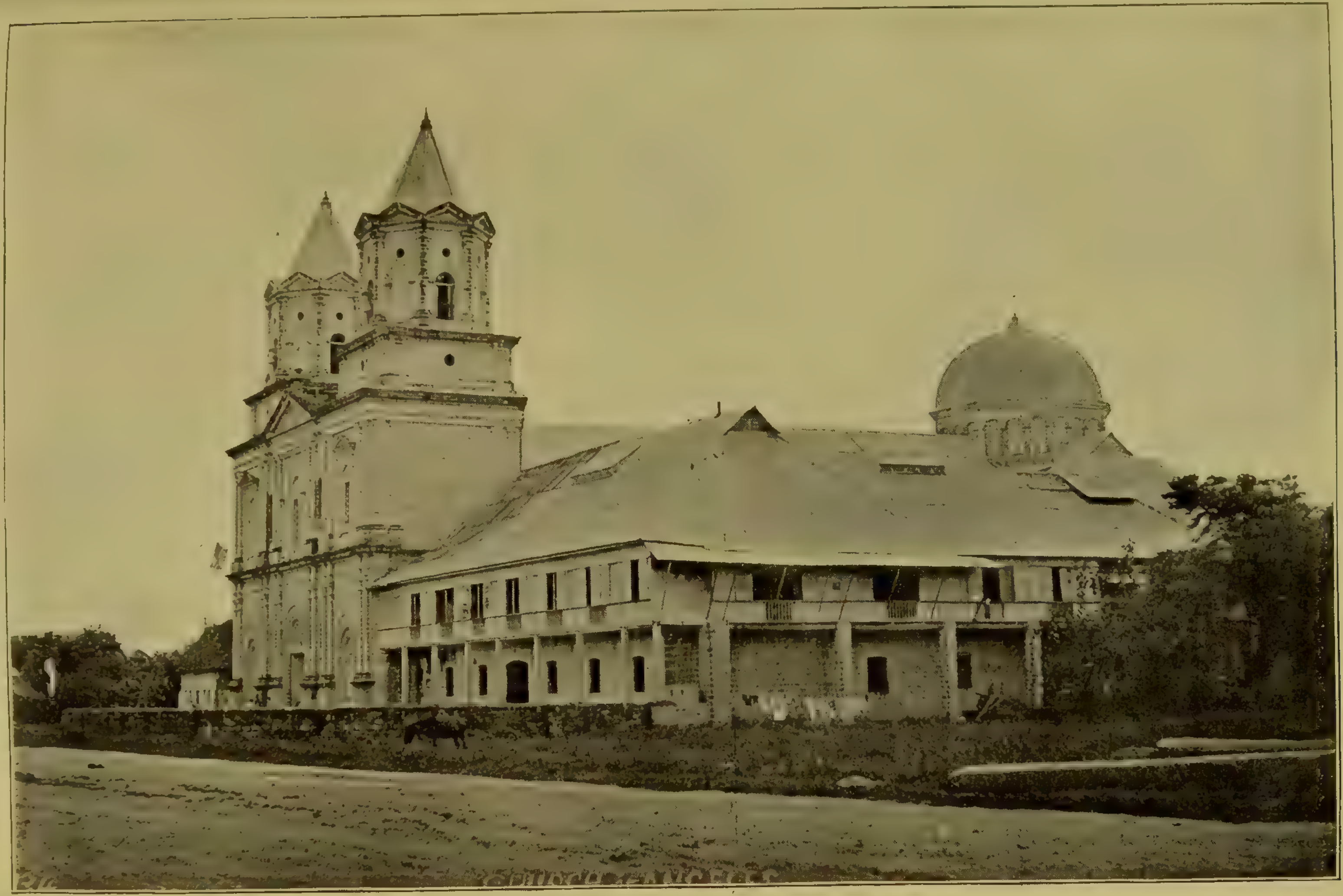
Administration.—The commanding officer, there being no executive officer, performed the duties of the latter together with those purely his own. The combining of these two offices being necessary, as no assistant surgeon was available for detail as executive officer. To each ward there was detailed an acting assistant surgeon as ward surgeon, and six privates of the hospital corps, one of whom was assigned as wardmaster, three as day nurses, and two as night nurses; special nurses being assigned when cases required such attention. To the surgical ward two competent privates were assigned to duty in the operating room and surgery. The work of the dispensary was performed by two privates, one of whom, Theodore C. Eppelin, was a graduate of pharmacy. The prescription work of the hospital, and that of a light battery whose sick call was held by one of the surgeons on duty at this hospital, was the work expected of the dispensary. The steward in charge of the medical supply depot having also the property of the hospital in charge, the ward masters obtained their supplies, other than medicines, from him at the hospital storeroom. The kitchen was equipped with two army ranges and a field range. In May, 1900, a bake oven was built. As no other range could be obtained or competent cooks be found in the hospital corps, the preparation of the food for all was done in one kitchen.

Food.—The credit of 40 cents per patient per day was found amply sufficient to purchase an abundance of what the subsistence department kept on hand, and in addition all the eggs, chickens, and vegetables which the country afforded. Capt. Harlow M. Street, commissary, United States Volunteers, depot sales commissary, deserves great credit for his uniform courtesy and energy in meeting every requirement of this hospital. At irregular times natives could by hard work gather around Macabebe, P. I., a few days' supply of tomatoes and radishes for the hospital, but the lack of anything like truck gardens on the island prevented the regular supply of fresh vegetables in sufficient quantities. The supply of canned vegetables kept by the commissary met this want as well as could be done by canned food. The malted milk, condensed milk, and evaporated cream, together with canned soups, furnished the greater part of the liquid diet necessary. Farina, rolled oats, cornstarch, tapioca, rice, tomatoes, gelatin, soup, eggs, crackers, fresh meat, and soft bread furnished the light diets. The fine quality of refrigerated fresh meat furnished, together with potatoes, peas, beans, corn, rice, tomatoes, onions, prunes, coffee, and soft bread furnished the heavy diets. A garden was started during the first half of April, and we have an abundance of onions and radishes and lettuce now. This garden has been increased and in time will afford an abundant supply of fresh vegetables, such as onions, radishes, lettuce, spinach, cabbage, and beets.

Water supply.—Prior to the middle of April a small quantity of artesian well water was obtained by the railway train from San Fernando, P. I., and the remaining quantity necessary was obtained by boiling the water from a previously-cleaned native well. After that date the water from the native well was sterilized by a Waterhouse-Forbes sterilizer, which afforded an abundant supply of pure and palatable water. About 150 pounds of ice being all that could be obtained from Manila, P. I., the need for more was often felt.

Medical supplies.—Medical supplies were obtained from the medical supply depot in Manila, P. I. They were often tardy in arriving, but as far as the essential medicines were concerned they usually were sufficient, and many articles to be considered as luxuries were furnished. The medical supply depot for the Department of Northern Luzon has been in charge of the commanding officer of this hospital. The medical supplies for the indigent natives for the Department of Northern Luzon were bought and distributed by this supply depot. The medicines for this purpose ordered cost $20,000, Mexican coinage, and will be distributed among 67 towns. The funds for the payment of the native vaccinators employed to vaccinate the natives in this department were disbursed from this depot. The cost of this work to date is about $4,500, Mexican coinage.

Sanitation.—The dry-earth system, using galvanized iron receptacles, is used. The contents of receptacles from rears, together with garbage, slops, and other refuse from kitchen, mess halls, wards, etc., are hauled away twice a day on native carabao carts about 800 yards from the hospital and buried 3 feet below the surface of the ground, the receptacles being thoroughly washed before they are used again. This system has been in operation at this place for seven months and has proved satisfactory in every way. One carabao cart, 5 Chinos, and 5 natives under a competent private of the hospital corps have performed this work, together with other police work necessary to keep the surroundings of the hospital clean. The complete separation of the kitchen and mess halls from the rears is a feature which is preventive of the spread of any infection from the latter. The hospital corps, besides doing the nursing, keep the wards and interior of the hospital clean. Cleanliness of bedpans, urinals, etc., together with a liberal use of crude carbolic acid in disinfecting them, has done much to prevent the spread of any infection. The laundry work has been done at this hospital by 5 natives, in charge of a competent private of the hospital corps. All clothing, bedding, etc., has been soaked for twelve hours in an acid bichloride of mercury solution, 1:1000, then boiled in a weak alkaline water and afterwards thoroughly washed. To this daily routine is to be attributed the



SECOND DIVISION HOSPITAL, ANGELES, LUZON.

freedom in the hospital from the spread of skin diseases, such as pemphigus contagiosus, tinea circinata, and other diseases, notably smallpox and typhoid fever.

Malarial infections.—The percentage of admissions from this cause was 48.26. The disease was usually of the irregular type, due to the æstivo autumnal and tertian organisms. The frequency of diarrhea as a complication or sequel was marked, and its persistency in many cases will explain the loss of so many days in the hospital by cases admitted for a malarial infection, which is not usually of a severe type. The judicious administration of quinine in solution by the rectum has never failed to terminate an attack. One gram sulphate of quinine thus administered at twelve hours' intervals has proved adequate for the severest cases; in the milder cases, 325 milligrams thrice daily was found sufficient. On admission, cases with high temperature from this or any other cause were given tub baths. In this disease, as in all others among soldiers here, it will be found particularly conducive to a rapid recovery to correct in the early stage any bowel disorder; and to this end fractional doses of calomel or a moderate dose of castor oil will be found to be indicated in the majority of cases. The hypodermic administration of quinine is particularly recommended for the rapidity and certainty with which it kills the organism in the blood; but the administration by the rectum will be found for these cases more satisfactory from its adequacy and its freedom from local irritations and abscesses often following the hypodermic method. In connection with the administration of quinine, it is to be noted, from the frequency of injudicious administration, that the persistent use for days of large doses is to be condemned without reserve, as such overdosing has been the cause of many cases of temporary mental derangement and a far greater number of a less pronounced type of nervous disorder, which retards convalescence in all cases and in the majority precludes the likelihood of complete restoration to duty in this climate. Fowler's solution of arsenic and tincture of the chloride of iron are valuable in the anæmia consequent on this disease.

Diarrhea has been the cause of 5.44 per cent of the admissions. Exposure to extreme heat in the dry season and to moisture and chill in the wet season, together with irregularities in eating, are the causes which produce diarrhea in the soldier here. These he can not avoid, in many instances, in the performance of his duty. Debility supervenes in the severe cases of diarrhea, hence the importance of rest and the early stopping of all food for twenty-four hours with a subsequent liquid diet for such cases. Such a course will do much to quiet an irritated bowel, hasten relief, and lessen the number of chronic intestinal disorders of this nature. If, together with this care, the bowel is thoroughly washed out with hot salt enemata, followed by a starch and opium enema, the majority of cases will be found to require little or no medication by the mouth. Anæmia and emaciation are marked features in prolonged cases of this disorder, and require iron and a general tonic treatment. Just now there are many of these chronic cases, incident to the recent campaign, which have reached a stage of anæmia, emaciation, and general debility that nothing short of a sea voyage to the colder climate of the United States will restore to health.

Dysentery has been the cause of 4.56 per cent of the admissions. The amœba would seem not to be a frequent cause of dysentery here—most of the cases being grafted on conditions malarial in origin. Cleansing enemata, followed by sedatives with small doses of ipecacuanha combined with salol and opium, have proved very efficient in these cases. When the system has been much depleted, hot saline enemata twice daily, to be retained, will be found very grateful to the patient and restorative. In all jaundiced conditions these hot saline enemata will be found valuable in correcting a stagnant hepatic circulation.

Skin diseases have caused 0.32 per cent of the admissions. The wide spread of tinea circinata, so-called dhobie itch, calls for the mention of a remedy, liquor calcis sulphurate, which has proved peculiarly curative in this disease. I took this suggestion from "Manson's Tropical Diseases" nine months ago and have never seen a case that it failed to cure. Considering the widespread nature of this disease, the cheapness and simplicity of preparation of the remedy are features that recommend its use aside from its effectiveness.

Typhoid fever has caused 0.28 per cent of the admissions—a comparatively small percentage.

MEDICAL OFFICERS.

The medical staff consisted of one first lieutenant and assistant surgeon, United States Army, and four acting assistant surgeons. Drs. Burke L. Johnson and Gilbert E. Seaman deserve especial mention for their uniformly faithful and efficient work in the medical wards and care of cases of smallpox.

Hospital corps personnel.—The hospital corps detachment averaged daily present for duty, 2 hospital stewards, 2 acting hospital stewards, and 52 privates. I have the honor to commend the following hospital corps men: Hospital Steward Paul L. Whitmarsh, United States Army, for faithful and efficient performance of his duty; Hospital Steward Henry C. Senecal, United States Army, for prompt, faithful, and efficient performance of his duty in the medical supply depot; Acting Hospital Stewards Gustav Bornhauser and Ernest A. Boeckh, United States Army, for particularly correct and efficient work and faithful devotion to duty in the record office at all times, and often when in ill health, and for their undoubted qualifications to perform the duties of hospital steward, United States Army, I recommend that they be promoted to that grade on the occurrence of the first vacancies, after conforming to existing regulations. For honest and faithful service: Privates Theodore C. Eppelin, Frederick James, Nickolis Veit, Joseph B. Jensen, Oliver C. Weldon, Edward L. Wilhelm, Ralph W. Ent, Joseph R. Gardner, Walter T. Pulpress, Irwin Kline, and Victor A. Swonberg. I recommend that Privates Eppelin and James be promoted to the grade of acting hospital steward, for faithful and efficient service in the dispensary and medical supply depot, respectively.

REPORT ON THE BASE HOSPITAL AT DAGUPAN, PANGASINAN, LUZON, BY MAJ. F. H. TITUS, SURGEON, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON, DEPARTMENT OF NORTHERN LUZON, DATED JUNE 1, 1900.

The hospital is pleasantly situated on the left or west bank of one of the mouths of the Agno River, about 1½ miles from the Gulf of Lingayen. It is rather an estuary than a river, as the water flows alternately in opposite directions, and is salt. The land is but little above high-tide level. The rise and fall of the tide is small—not more than 3 feet at spring tide. The principal portion of the town of Dagupan lies on the opposite bank of the inlet, while to the west and northwest are salt marshes.

The principal building, and, in fact, the only one used for strictly hospital purposes at present, was intended for a college. It is L shaped; one wing extending north and south along the water front and the other extending westward from the southern end of the first. The lower story is of masonry and the upper of wood. The floors of the lower story are mostly of cement or tiling, and are in quite good condition; but those of the upper floor, which are of wood, are old, and were not of the best quality when new. The cracks between the boards of the flooring and various holes in them allow the free passage of water, and as there is no ceiling to the rooms below, it is impossible to scrub the floors of the second story without almost surely soiling whatever may be in the rooms below. The absence of ceiling also renders the building very noisy. The roof is of galvanized iron, and is in very good repair.

On the north side of the grounds is a stone wall, and on the west front has formerly been a fence of a combination of wood and brickwork, of which the latter only remains.

The kitchen is a temporary expedient of bamboo and nipa, entirely unsuited to the rainy season. A stable of the same material has just been constructed for housing the ambulances and animals. I think it will answer the purpose very well.

The portions of the building now occupied as wards cover about 17,600 square feet of space, which would give room for 352 patients, allowing 50 square feet to each; but on account of the shape of the rooms some of the floor space is unavailable; allowing 5 feet in length of ward for each bed reduces the number which can be comfortably accommodated without crowding to 293.

In the matter of quarters for officers, female nurses, and men of the hospital corps, the hospital is at present poorly equipped. The officers and nurses are in native houses in the neighborhood of the hospital, none of them suitable for the purpose, while the men of the corps have no shelter but tents. At the request of the chief surgeon of the department, an estimate was sent in for the construction of a suitable barracks for the men. It has been returned disapproved, with orders to floor the tents with bamboo, which it is considered will be sufficient for their comfort in this climate, a view in which I do not participate.

I am informed that a requisition has been made for thorough repairs and additions to the hospital, and also that it will not be approved.

Food.—It has at times been difficult to provide the proper kind of diet for the sick, from the impossibility of procuring stores from the commissary. Chickens and eggs are to be procured from the natives, and usually at reasonable rates, but practically nothing else.

Medical supplies.—Since my connection with the hospital there has been but little trouble about the supply of medicine, but some badly needed supplies have been slow in arriving.

SECOND DIVISION BASE HOSPITAL, DAGUPAN, LUZON.

Medical officers.—The medical officers on duty at the hospital I have found to be ompetent and reliable. There should in my opinion be one or two additions made o the number.

Hospital corps personnel.—The steward and acting stewards are excellent men, but regret to say that as much can not be said of the privates as a whole, though there re many good men among them.

Trained nurses.—There are fifteen trained nurses assigned to duty at this hospital, nd most of them are competent and trustworthy. To me it is a satisfaction to have n immediate charge of the sick persons trained to the work.

Water supply.—The drinking water in use during the dry season, at least, is proured from wells, and being in the immediate neighborhood of the salt water, is, as vould naturally be expected, slightly brackish. It is all boiled and filtered before eing used. The supply is ample.

Sanitation and disposal of fæces, etc.—Dry earth closets are used. The only method f disposing of fæces, slops, etc., at present possible, is to empty them into the water n front of the hospital, where they, to a large extent remain, as the outgoing tide is ot strong enough to carry them far enough out to prevent their floating in again when he tide turns, and from the configuration of the land, and the usual direction of he wind, the refuse seems to lodge mostly in the immediate front of the hospital, to ur great annoyance, to say the least. Requisitions have been made for a boat or cow to take the refuse out to sea and dump it, and for a steam launch to tow the same. It is earnestly hoped that these requisitions may be approved.

For the launch there is the still further necessity that there are two bridges between the hospital and the railroad station where nearly all the patients are received, distance about a mile and a quarter, which bridges, I am informed, are carried away every winter, and without water communication of some kind there would be no means of bringing the patients here.

Special diseases.—The principal diseases met with are diarrhea, dysentery, and the different forms of malaria; these three causes furnishing 60 per cent of the total of cases. The greater portion of these cases are amenable to treatment; but some are very stubborn, and in all cases of sickness here the debilitating effects of the climate must be contended with. Many cases which would apparently continue indefinitely here, when sent to the United States arrive there quite well.

We have occasional cases of pernicious malaria, which require heroic treatment, and even then the results are by no means always satisfactory.

The treatment of dysentery by large doses of ipecacuanha has been usually followed in this hospital with satisfactory results.

Dagupan is an important station, being the terminus of the railroad from Manila, and also accessible by water. It will probably increase in importance in the future. This building, while susceptible of many improvements, is much better adapted to its present use than most buildings not constructed for the purpose, and the manner in which it has been equipped is, on the part of the medical department, very liberal.

REPORT OF MAJ. EUGENE L. SWIFT, SURGEON VOLUNTEERS, CHIEF SURGEON SECOND DISTRICT, DEPARTMENT OF NORTHERN LUZON, TO THE CHIEF SURGEON OF THE DEPARTMENT, DATED AT APARRI, MAY 31, 1900.

Geographical area, etc.—Provinces of Cagayan, Isabela, and Nueva Viscaya. Command: Sixteenth United States Infantry and two battalions of the Forty-ninth United States Volunteer Infantry. Medical officers 10, including 5 acting assistant surgeons, with 3 hospital stewards, 2 acting hospital stewards, and 41 privates of the hospital corps; no trained nurses.

Medical administrative features.—The chief surgeon is stationed at the headquarters of the district at Aparri. Medical officers are not assigned specially to the regiments, but are stationed at posts where their services are needed.

Methods of caring for the sick and wounded in the field, especially during action.—Most of the large posts in the district have the medical and surgical chests and sterilizer. Some stations which should have this necessary field equipment are without them. Only two stations Aparri and Tuguegarao, have ambulances. Requisitions have been made for field equipment of stations. Insufficient quantity of litters throughout the district. Transportation for medical supplies when taken in the field inadequate.

Regimental and camp hospitals.—There are no regimental hospitals, as the troops of the different commands are intermingled at the different stations. Base hospital of the district at Aparri, a comfortable hospital; supplies running short. Camp hospitals at Alcala, Ilagan, Echague, Solano, and Tuguegarao. All in comfortable buildings.

Medical supplies.—Medical supplies very deficient. Requisition made April 5 received here on the 23d instant. Supplies for all stations in the district in need of them are being forwarded as rapidly as possible. This requisition was approved in the office of the chief surgeon, Division of the Philippines, on April 9. A great deal of it has not been filled, and the former officer in charge of this office did not call for sufficient supplies. In a few days a requisition for supplies sufficient to carry this district through the rainy season will be forwarded. All the posts have been urgently calling for supplies, and until recently there have been none on hand to send them. On my inspection I found troops in the province of Nueva Viscaya almost destitute of medical supplies; requisition forwarded at once by courier, and telegraphic requisition made upon the chief surgeon, Department of Northern Luzon. It is hoped that these supplies reached them before May.

Supplies are obtained for the Cagayan Valley by requisition on the subsupply depot at Aparri; for Nueva Viscaya, overland from railroad to Caranglan, and over the mountains by Corribillos Pass.

Transfer of sick and wounded to other hospitals.—Convalescents from long illness, where it is deemed advisable in each particular case, are transferred from the camp hospitals in the Cagayan Valley to the base hospital of the district at Aparri. Chronic cases and cases requiring the attention of specialists transferred in like manner. Nueva Viscaya cut off by reason of the character of the trails leading out of that province.

Sanitation.—Sanitation of all camps carefully taken care of. Water boiled. Fæces deposited in deep pits, more than one hundred feet distant from kitchens and barracks, covered over daily with dry earth, and in some posts burned over daily by means of dry leaves or hay. Dry earth closets being shipped to all camps in the district will soon be in use. Slops deposited in pits more than one hundred feet away from the kitchens and sleeping apartments, or hauled and dumped in the large rivers.

Sleeping arrangements.—In buildings hired for the purpose; in many camps repairs needed to quarters to keep out the rain.

Food.—Army rations. Potatoes unable to be shipped beyond Tuguegarao. All other camps do not get potato ration. Fresh beef at Aparri, Lalloc, Tuguegarao, Ilagan, and Lineo; all other stations seldom get fresh beef. Echague, Cordon, Carig, San Luis, and all other posts in Nueva Viscaya on three-fourths rations up to April 20, 1900; also without fresh meat or potatoes. Fresh meat they have managed to obtain in the set of stations just mentioned about once a week. An epidemic of rinderpest among the cattle in this locality is reported to have recently broken out.

Cooking, etc.—Field ranges at all stations.

Efficiency of medical officers.—With the exception of Capt. Robert Burns, assistant surgeon, United States Volunteers, and First Lieut. W. P. Chamberlain, assistant surgeon, United States Army, the medical officers are without experience in administrative work, the keeping of records, and the preparation of papers. Acting Asst. Surg. J. S. Hill sick. All officers appear to be zealous in the performance of their duties.

Efficiency of the hospital corps—Almost all the men of the hospital corps are recruits or men of short service, and the greater part of them lacking in instruction.

Prevailing diseases.—Variola, diarrhea, dysentery, and malarial fever. These diseases were prevalent in the country before our troops entered it. Variola due to the carelessness of the natives and neglect of vaccination. Other diseases mentioned endemic in the country. Malarial fever due to the presence throughout the island of Luzon in an intense form of the germ upon which the disease depends; in Nueva Viscaya particularly malignant. Diarrhea and dysentery due to tropical climate, great moisture, and rainfall, and the drinking of contaminated water. These diseases particularly severe in the province of Nueva Viscaya.

Vaccinations.—All the troops at Aparri and in the province of Nueva Viscaya vaccinated, but virus inactive on account of the length of time required to transport to the stations in the province mentioned. Other virus has lately arrived and troops will be revaccinated. Troops of the Second Battalion, Sixteenth United States Infantry, stationed at Ilagan, have been vaccinated during this month, but the two companies of this battalion stationed at Tuguegarao not yet vaccinated. Troops of the Third Battalion, Sixteenth United States Infantry, partially vaccinated during this month. Troops of the Forty-ninth United States Volunteer Infantry vaccinated four times previous to their arrival in the district.

Virus now being sent up the river for the vaccination of the native population. The native population of Aparri and its surrounding barrios vaccinated during this month by native vaccinators.

REPORT OF LIEUT. W. P. CHAMBERLAIN, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE HOSPITAL AT APARRI, CAGAYAN, SECOND DISTRICT OF THE DEPARTMENT OF NORTHERN LUZON, MADE TO THE CHIEF SURGEON OF THE DEPARTMENT, JUNE 1, 1900.

Command.—The command at this post has been the headquarters Sixteenth Infantry, with band, headquarters, and usually three companies of the First Battalion of the regiment. In addition, this hospital receives patients from the remainder of the Sixteenth Infantry and from two battalions of the Forty-ninth United States Volunteers, stationed in this district.

Hospital buildings.—The present hospital building has been occupied since the early part of March. It is a substantial structure of large size, with a basement of stone about 8 feet in height. The second story of the building is constructed of wood, with a galvanized-iron roof. Windows are closed with the usual sliding sash, set with oyster-shell plates. Nearly all windows are shaded with nipa awnings. In the basement are the storeroom for the hospital and district supply depot, and also two native shops, from which it has thus far been impossible to have the occupants removed. This basement is for the most part tiled, and is fairly well ventilated. In the lower hall is the dispensary, and sick call is held here. In the hallway of the second floor are placed the tables for the mess of the hospital corps and patients. The office has till recently served also as the office of the chief surgeon of the district. The officers' ward is the most secluded and has 5 beds. There is a large central ward, accommodating 17 patients, and three small wards, one of which is used for colored patients and contains 8 beds. The total capacity of the hospital at present is 46, with an average floor space of 48 square feet and an air space of 503 cubic feet per man. Cubic air space is, however, not an important problem here, as approximately one-third of the wall space is devoted to windows, which are always open, thus offering a rapid change of air. The operating room is conveniently located and well lighted. It is provided with an iron operating table, a Kelly pad, sufficient basins, pitchers, and jars for dressings, and enough of instruments for ordinary needs. Back of the operating room is a room for dressings and instruments, also containing a blue-flame oil stove. No bottles for solutions nor flasks for flushing nor a suitable Arnold sterilizer have been furnished, though asked for on requisition, which was approved. The kitchen is ample in size and has attached a sufficient storeroom, secured by lock and key. An excellent range of large size is provided and does efficient work. The outfit of cooking utensils is enough for all needs, as is also the table equipment. The cots throughout the hospital are of the regulation adjustable pattern and are all provided with three-section hair mattresses, protected with mattress covers. Feather pillows, sheets and pillow slips, pajamas, nightshirts, and slippers are in abundance. Washing is done in a reasonably satisfactory manner by native women, who are paid at the rate of 2¼ cents, gold, per piece. All articles in any way infected are soaked for at least twenty-four hours in carbolic-acid solution (1:20) before leaving the hospital.

Water supply.—This is satisfactory. At present the whole post is provided with rain water, which is boiled in a Waterhouse-Forbes sterilizer and then distributed to barracks, hospital, and officers' quarters. Moreover, a supply of rain water is always on hand in the hospital, being kept in a large boiler-iron tank provided for that purpose. Well water in this town is bad, being all from shallow wells affected by proximity to salt water and liable to many kinds of surface contamination. Bathing facilities are satisfactory, a bath tub on wheels and washstand being located in a portion of the hall screened off as a lavatory.

Food supply.—This has been, on the whole, satisfactory. Purchase of eggs, chickens, fresh fruit, and vegetables in open market are generally possible, and fresh beef of fair quality is available every other day. Excellent bread is furnished from the post bakery. Certain supplies, such as malted milk, evaporated cream, condensed milk, and some varieties of soups, can not always be obtained from the commissary. Evaporated cream and malted milk have been asked for on medical requisitions, which were approved; but none of the former and little of the latter have been received. The cost of the mess for patients in February was 39 cents per man; in March, 31 cents; in April, 39 cents, and in May, 39 cents. Savings from the hospital corps ration was in January, $11.94; February, $4; March, $4.75; April, $7.67, and in May, $7.21. The hospital fund has been steadily increasing, and on April 30, 1900, the balance on hand was $110.37. Since then $20 have been transferred to the hospital at Ilagan, but the receipts this month will probably be double that sum. This fund is not needed to buy articles of diet. Authority has been requested to expend a part of it to purchase a milch carabao, and another portion to buy certain articles of durable property, which will be very convenient for ward management and which can not be otherwise obtained.

Disposal of excreta and waste.—The water-closet is unfortunately situated adjacent to the kitchen, this being unavoidable, owing to the plan of the house. There is, however, no communication between the two, and the walls separating them are papered on both sides. The door is kept constantly closed by a weight. Excreta is received in closed stools, which are kept always covered when not in use, and carbolic-acid solution (1:20) is frequently added to the contents. The receptacles are emptied at regular intervals. A dry-earth closet in a tent back of the hospital is used by the corps men, the pans being daily cleansed by contract labor. Garbage and slops are deposited in barrels and hauled away daily.

Medical officers.—The detail of medical officers at this post has been as follows: From January 1, 1900, to March 28, 1900, one assistant surgeon, Lieut. H. S. Greenleaf; from March 28 to May 31, Lieut. W. P. Chamberlain, with, since March 12, one acting assistant surgeon, Dr. Nevil M. Garrett. In addition to post work, the assistant surgeon has, until May 17, performed the duties of chief surgeon of the district, and has acted, and still continues to act, as health officer of the post and sanitary inspector of the town, visiting all steamers and coasting craft on their arrival and departure from the post, and making a bimonthly house to house inspection of the town.

Hospital corps.—The men stationed at this post are approximately 1 hospital steward, 1 acting hospital steward, and 12 privates of the corps. During the last two months 2 and at times 3 men have been on detached service. In addition to the regular post hospital work a large amount of additional work has fallen upon the corps here by reason of the correspondence and paper work connected with the chief surgeon's office, and as a result of receiving, assorting, packing, and shipping of medical supplies for other stations in the district. All the members of the corps since my arrival have discharged their duties in a manner reflecting much credit on themselves and upon the officers who supervised their previous training. No instances of distinguished service by medical officers or Hospital Corps men have come to my notice, but prior to my arrival Hospital Steward Thomas D. Hare, United States Army, lost his life in the honorable discharge of his duty, being either shot or drowned on the night of March 1, 1900, when a launch loaded with troops was capsized near Linao, being at the time under heavy fire from the insurgents on shore.

Hospital Corps quarters.—A separate house is rented by the quartermaster for hospital corps men. This contains a room each for two stewards and two rooms for the privates.

Civilian employees.—No female nurses have been on duty at this hospital. Four natives are employed at the rate of $3 (gold) per month, and are found very useful for doing rough work.

Administration.—This has been satisfactory. The mess management is under the direct and constant supervision of an acting hospital steward. An excellent nurse as wardmaster cares efficiently for the needs of the sick. The operating room is under the immediate charge of a private of the Hospital Corps, who is a graduate dentist and possesses an excellent theoretical and practical knowledge of minor surgery and the care of an operating room.

Equipment and clothing.—This is satisfactory. The press of work in the case of both surgeons and corps men has prevented systematic training by lectures and litter drill.

Dentistry.—A graduate dentist (recently examined for promotion to acting steward), stationed at this hospital, has just received a portion and soon expects the remainder of a complete dental outfit, after which he will be available to attend to the needs of those in the district requiring the attention of a dental surgeon. His employment at this work will doubtless add not a little to the value of the services performed by the Medical Department in this region.

Medical supplies.—These have been satisfactory in quality, but many important articles of medicines and dressings have been entirely lacking during May on account of the delay in filling the requisition of April 5 sent from this hospital. The supplies did not arrive until April 23, 1900. Blank forms of many kinds have been exhausted and none have been received, though asked for on requisition dated March 24, 1900. A microscope is much needed and was invoiced to this post, but failed to arrive, and no other has been sent, though asked for.

Library.—A library of 15 standard medical works has been supplied to the hospital, and of late medical journals have been sent into this district for circulation among the medical officers here stationed. A large number of old periodicals have been furnished by various societies for the use of patients. A request to purchase standard American newspapers and magazines from the hospital fund was disapproved.

Character of diseases.—It is impossible to determine the percentage of total sickness or of any particular disease, because the number of troops served by this hospital has been so variable. No disease has been present in a marked degree, and all have been of mild type. Malaria has never been severe or well marked, and in default of a microscope there has been some doubt as to accuracy of the diagnosis in the cases of slight fevers of short duration. Diarrheal diseases have not been of severe type, but many have shown a decided tendency to become chronic. Venereal diseases were very prevalent here at the time of the arrival of the Sixteenth Infantry from the country just north of Manila, being almost entirely acute gonorrheal and chancroidal. The amount has been steadily decreasing, and in May only one new case appeared on sick report. Skin diseases have been few in number and slight in degree. Only one case of typhoid has occurred, and that probably did not originate at this town, as the patient entered hospital but twelve days after his arrival here.

Wounds.—The marked increase of wounds and injuries in March resulted from the fight near Linao, March 1, 1900. All these gunshot cases occurred before my arrival, and when first coming under my observation presented nothing of marked interest. A compound comminuted fracture of both tibia and fibula, near the ankle, resulted unfavorably owing to impaired circulation in the foot, inability to hold the fragments in proper position, and apparent fibrous union. There is now some ankylosis of the ankle. A perforating gunshot wound of the chest resulted in marked pleural thickening.

Smallpox.—No case has occurred among troops at this post, although 13 cases have been found among the natives. All soldiers have been vaccinated twice since arrival at this station. Vaccination of all natives is now in progress.

Death.—None among patients have occurred since January 1, 1900. Five men have been killed in action or drowned from this command.

Transferred.—Nineteen men have been transferred to hospitals in Manila, of which 12 were for discharge for disability, 3 for special treatment, and 4 for transfer to the United States for benefit of climate.

Increase in size of hospital.—The hospital has of late been filled nearly to its limit as a result of patients coming from other parts of this district. The district chief surgeon has stated that still more are likely to be sent to this point as a base, and therefore a request has been made for an additional house which will accommodate about 30 beds, making an aggregate of 76 beds.

Recommendations.—This town is in a cool, healthful, and accessible locality, and is likely to continue to be the base for the district, which will for a long time to come require a considerable military force. In view of these facts the following recommendations are respectfully submitted:

(1) That proper hospital buildings be constructed here at the earliest opportunity, thus avoiding the present makeshift policy of occupying native houses, which are difficult to keep clean, are crowded to the lowest safe limit of individual air space, and which can not have the best through ventilation because of partitions dividing them into many small rooms. Particular attention should be given to the construction of the roof, as otherwise the temperature of the wards will be excessive most of the day. Either the building should have a ventilated attic or else the roof should be double, with an air space between. Galvanized iron alone will be exceedingly unsatisfactory. (2) That an ice plant be installed as soon as possible. This was asked for by Lieutenant Greenleaf in March and request was approved by the division chief surgeon. (3) That a small steam laundry be provided in the interests of both economy and efficiency. The advantages of having clothing and bedding boiled at the time of washing are numerous, and no native washerwoman does this. A laundry could be run from the same boiler that furnishes power for the ice plant. (4) That female nurses be provided as has already been requested. Up to the last few weeks their services were not needed, but severe cases are now appearing and will probably continue to appear. (5) That iron bedsteads with woven-wire springs be sent to replace adjustable folding cots.

REPORT OF MAJ. FRANKLIN A. MEACHAM, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON, THIRD MILITARY DISTRICT, DEPARTMENT OF NORTHERN LUZON, MADE MAY 31, 1900, TO THE CHIEF SURGEON OF THE DEPARTMENT.

Pursuant to General Orders, No. 1, paragraph 2, dated headquarters Division of the Philippines, Manila, P. I., April 7, 1900, the Third Military district of the Department of Northern Luzon, was created by consolidating the territory occupied by the First and Fourth Brigades, Second Division, Department of the Pacific and Eighth Army Corps.

The Third Military district covers the territory lying within the provinces of Tarlac, Pangasinan, and Zambales, including the towns of Rosales, Cuyapo, and San Juan de Guimba, lying along the northwestern boundary of Nueva Ecija and adjacent to

already been supplied for six months, to carry them through the coming rainy season, beginning with the first day of June.

Water supply.—The water supply is from wells, running streams, a few springs, and a good artesian well at Tarlac. The wells are shallow and walled with stones. When our troops first occupied the towns only such wells were used as were recommended by the medical officers after careful inspection. All others were closed. Those selected were cleaned out and the walls raised about 2 feet above the surface and protected by suitable covers. These wells were selected with great care as to the surrounding drainage, and were as far removed from sinks and garbage pits as possible. Water from all sources has at all times been boiled and filtered. Each company has one Pasteur filter. After filtration the water is cooled in large earthen jars, which are cleaned each morning. These instructions have been faithfully carried out during the past dry season by the troops in this district, as far as personal observation and repeated inspections can determine, In a few instances company commanders have kept cold coffee constantly on hand, cooled in the earthen jars. In the regimental hospital, Seventeenth Infantry, weak cold tea has been kept for general use. The task of habituating the soldier to the use of boiled water while in camp has been difficult, its smoky and insipid taste being objectionable, but this has gradually been overcome. Several Waterhouse-Forbes sterilizers have been in use in this district during the past two months. This sterilizer has so far given entire satisfaction, as now furnished for field use, doing away with the objectionable taste heretofore experienced in water boiled over camp fires.

Laundry and bathing facilities.—For a long time the laundry facilities consisted simply of native laundresses, who pound out the dirt with clubs in cold water, drying the clothes on the grass in the sun. The majority of the soldiers do their own laundry work, and for a long time used the method practiced by the natives at the streams and pools wherever they happened to camp. It was soon learned that this method furnished abundant opportunity for the transmission of various mycotic diseases. This has been remedied to a great extent by insisting upon the boiling of the clothes, orders to that effect having been issued from Second Division Headquarters. During the past dry season the bathing facilities at the various posts, except those on the larger streams and seashore, have been nil. All seem to have readily adopted the primitive methods of the natives. The regimental hospitals, however, have been furnished with portable bath tubs.

Barracks and buildings.—The troops are quartered in the deserted Spanish convents, other public buildings, and nipa houses, throughout the various pueblos and barrios. In the convents and public buildings troops occupy the second story, the first story as a rule being occupied for administrative purposes. The nipa huts occupied are raised from 6 to 8 feet from the ground. The ventilation in all instances is the best, and there is no overcrowding. Barracks and buildings are regularly inspected and are kept neat and clean. Medical officers are held strictly responsible for the sanitary condition of the posts in their command. All barracks and buildings have been repaired and put in condition for the coming rainy season. At such posts where suitable buildings for the rainy season do not exist such buildings for the troops, stores, and animals are now being constructed.

Policing.—The policing of the grounds about the barracks and buildings occupied by troops is excellent and is regularly done. This good example has had its influence more or less throughout the various pueblos and barrios. Where troops are stationed such policing is done by the presidente of the town and by the cabezas of the barrios, under instructions from the commanding officers. Large quantities of underbrush, banana trees, and the like have been removed from around the buildings and huts, allowing the free entrance of the sun. The work has been going on throughout the present dry season, and particularly is this true concerning the many market places. These are regularly policed after each market day and the refuse burned. The general appearance of the towns since the advance of our army north from Angeles, November 8, 1899, has improved wonderfully and countless insanitary evils among the natives have been remedied.

Disposal of waste.—No ground drainage except by percolation through the soil. Dejecta are disposed of in sinks. The individual covering of the dejecta by dry earth is in use by all troops and is very rigidly enforced. Any neglect of this order is severely punished. At times the bottom of the sinks are covered with twigs, straw, and paper, which are then burned. This entirely destroys any slight odor that may have been present. The digging of pits for kitchen slops and fæcal matter less than 100 yards from the men's quarters is prohibited. Garbage is disposed of in pits and covered daily. This system, during the dry season, has given entire satisfaction. At the present time, as the rainy season is approaching, the dry-earth closet system is in use. Each company and detachment throughout the district, regimental headquarters, and all officers' quarters have been provided with these closets as furnished by the quartermaster's department. These closets are covered by suitable sheds and surrounded by a ditch so dug as to allow all rain water to flow away. This is the only system which can be used during the rainy season with any degree of satisfaction. At posts located on the seacoast closets have been built over the water, with suitable covering. Garbage is collected in barrels and cans provided by the quartermaster's department, which are emptied and cleaned every morning by hired scavengers. At some posts dry earth has been collected and properly protected for use during the rainy season. The natives have no method of disposing of garbage or fæcal matter. In the dry season garbage and fæcal matter in the yards and streets are disposed of by the dogs and pigs, while in the wet season the heavy rains are depended upon to remove the filth.

Clothing.—The clothes must be loose and comfortable. On the march part woolen should be worn next to the body. Experience during the past wet and dry seasons shows that the clothing now furnished is fairly well adapted to this climate. The supply at the depots has been sufficient. The shoes and socks give entire satisfaction. For the march the light woolen sock is preferable.

The recent issue of the campaign hat with corrugated sweat bands and ventilation in the sides possesses advantages not obtainable in other form of headgear for constant use and all around field service. It is far superior to the straw hat, and, during the rainy season, to any cork or pith helmet. The latter requires more or less care at all times, both on and off the head.

A part woolen undershirt is necessary to protect the body from sudden chilling. The cotton or nankeen undershirt is cold, clammy, and sticks to the body while in profuse perspiration. This is especially noticeable during the five minutes' rest given hourly on a regular march.

The lighter issue of the blue flannel shirt answers fairly well at all times, but is objectionable in some respects. Its color more readily absorbs the heat and can be distinguished a long distance, making the wearer a good mark for the enemy. A gray flannel shirt of medium weight is preferable. The flannel shirt has the advantage of keeping the body warm, even when wet, night and day. The soldier prefers to wear the blue flannel shirt on the march, with no undershirt, the sleeves rolled up, open in front, and the collar well rolled back. It is thus made very comfortable, the campaigner readily becoming accustomed to the sun's rays. One great objection to this shirt is its irritating effect on the skin. On returning to camp at night the soldier puts on the cotton undershirt as a protection against this irritation.

Of the clothing furnished at present for active campaigning, I have found that the light-gray woolen undershirt of light weight, with an overshirt of chambray or gingham, gives comfort and satisfaction. Personally I have found the most comfort from the gray outing flannel of medium weight, worn with no undershirt. This same material of a khaki color would be still better. It prevents chilling, is never too warm, nor sticks to the body, but absorbs the perspiration and dries readily. A cotton undershirt worn under this while in camp gives one the greatest amount of comfort, and is sufficiently warm for the night. As the nights here are usually cool, sufficient covering for the abdomen must be worn. For this the blue flannel shirt answers well; in fact, it has become quite customary when not on the march, but lying in camp, for the soldiers to wear the blue flannel shirt at night. The coolness of the night while lying down is severely felt upon the abdomen, often enough to keep one awake and interrupt his rest. Even a slight covering is a help, and for this the flannel bellyband should be worn. The neglect of this is undoubtedly the predisposing, if not often the actual exciting cause of many of our intestinal ailments.

The white jean drawers answer all conditions at all times; they are loose, comfortable, and safe.

The khaki fatigue uniforms are excellent.

During the wet season the large ponchos now furnished are of more service than a rain coat or mackintosh. They protect sufficiently well and are not as hot as the mackintosh; besides, they serve as a blanket or covering at night.

The above remarks refer only to field service.

Food supply and its preparation.—The ration as now furnished by the subsistence department to the troops in this climate is of the first quality, and, as a rule, well prepared for use. It occasionally happens that its preparation is faulty, but this is due to the inexperience of the cooks. With the system of company savings it is difficult to see wherein any change in the component parts of the issue ration would be of any material benefit. Such foods, peculiarly adapted to the localities or climate in which the troops are stationed, are obtainable in the markets of such localities. Much of late has been said that the animal foods should be reduced one-half, substituting an equal amount of the farinaceous foods. Experience with the meat ration as issued to-day in these islands shows that our troops in the present hard and continuous campaigns not only require the quantity of animal food they have been accustomed to, but actually crave it and use it with no ill effect. This I have heard expressed by officers and men on many occasions. However, for tropical use I believe the present issue of albuminous compounds and hydrocarbons or fats should be reduced a certain small percentage, more especially the fats, and their place be advantageously taken by the sugars. In other words, the sugar components of the ration for tropical use should be increased. This reduction of animal food is already accomplished by the full allowance of fresh beef seven out of ten days, and equal money value for the remaining three days of other articles for sale issued. This saving, together with the usual company saving on pork and bacon, will purchase the requisite amount of sugar necessary for the increase of this component. All that is really necessary to obtain the best dietary for tropical use is for medical officers to call the attention of company commanders to the fact that in the sugars we have a food that undoubtedly promotes health and enables the soldier to put forth greater exertion to overcome his many hardships. Company commanders may thus vary the daily dietary by the purchase of more sugar for the suitable preparation of the dried fruits, or preserves, jams, and jellies provided by the subsistence department. To the increased sugar component should be added chocolate. In this present campaign, who has not seen and personally experienced the benefit derived from the sweetened chocolate while on a fatiguing march in the hot sun? It is more or less customary to carry in the pocket a package of this sweet chocolate when it can be obtained. The avidity with which the soldiers, both old and young, welcomed the supply of confections sent to these islands bears out these statements. Our troops in the present campaign have done and are still doing more actual work than the ordinary man, and the dietary as modified above answers most admirably. What change in the present ration the conditions of garrison life in times of peace in this climate will receive is a question which must be decided by experience.

Prevailing diseases.—Diarrheal and malarial diseases cause by far the greater number of admissions to the sick report, while rheumatism and diseases of the respiratory organs form the smallest proportion. There has been a comparatively small number of cases of typhoid fever since the Second Division advanced north from Angeles last November. The majority of the cases that have occurred developed early in the present dry season, reaching its maximum during the month of March. From March to the present time the number has steadily diminished. That typhoid fever is endemic among the natives in these islands is now beyond dispute. The source of infection among the troops has been clearly traced to drinking water while on the march or scouting. I have already reported cases of typhoid occurring in this command in my weekly inspection reports of December, 1899, January and February, 1900. Since that time there have been abundant opportunities for seeing cases among natives who are sick with the so-called "calentura" or fever, which from its history and the clinical picture presented I recognized as typhoid fever. I have learned also from Dr. Barrera, a native physician of Concepcion, province of Tarlac, that typhoid existed in that town principally during the dry season. He speaks of it as *calentura intestinalis.* I learned the same fact from a native physician at Victoria, province of Tarlac, Dr. C. B. Lazaro. These physicians are well educated medical men, Dr. Lazaro having studied in Paris and Madrid. The recent outbreak of typhoid in a command stationed at Paete, on Laguna de Bay, traced to drinking water, adds additional proof.

All conditions exist among the natives for the prevalence of typhoid in these islands, there being absolutely no sanitary precautions in the rural districts. Dejecta and refuse of all kinds are scattered over the whole country during the rainy season, as reliance is placed upon the rains for cleaning their streets, yards, and outhouses. No one who has seen the native market venders handle and prepare their vegetables and other classes of foods in the same canal or pool wherein they dump refuse and wash their persons and clothing could wonder at the prevalence of *calentura intestinalis* in these islands.

There is a large prevalence of skin diseases, especially of mycotic origin, popularly called dhobie itch, situated in the groins, about the genitals, and in the axillæ. This affection is widely distributed, and often so severe as to unfit men for duty.

Habits of the men.—The habits of the men as a rule are excellent. The hard work of patrolling the many roads, scouting, and the vigilance required against frequent attacks, has taken away the greater part of any craving for immoral pursuits. Base ball is not infrequently indulged in. Cleanliness of clothing has been good. Intemperance is rare, although not a few are addicted to the use of the native gin, known as vino or anasau, the effects of which are most disastrous. One death occurred in the Thirteenth Infantry at Magaldan, suddenly, following the eating of a large number of mangoes and drinking a pint of this vino. The establishment of canteens, where cool beer could be obtained, has almost done away with vino drinking.

The percentage of venereal diseases is greater than it should be, occurring largely among those of other vicious habits.

Reading rooms have been established at many of the larger posts, which are of great benefit to the men.

Major Meacham closes his report with an account of the vaccination of natives in the various towns of the district, a summary of which has already been given in the report of the chief surgeon of the department (see page 123).

REPORT OF MAJ. H. S. T. HARRIS, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON FOURTH DISTRICT OF THE DEPARTMENT OF NORTHERN LUZON, SAN ISIDRO, JUNE 25, 1900.

The district embraces the province of Nueva Ecija. The following stations along the Rio de la Pampanga are garrisoned by the Twenty-second Infantry: San Luis, Candaba, Arayat, San Antonio and San Isidro. Eight companies of the Thirty-fourth Infantry garrison the towns of Gapan, Penaranda, Cabanatuan, and Bongabong, all of which places are in the eastern part of the valley of Luzon; Aliaga rather to the westward in the edge of the great swamp, and Baler on the east coast. The towns of Pantabangan, Carranglan, San Jose, Hummingan, San Quentin, Tayug, San Nicolas, and Santa Maria, all situated in the foothills or at the base of the mountains, are garrisoned by eight companies of the Twenty-fourth Infantry.

Stations of medical officers.—One medical officer is stationed at each of these towns, except San Luis, San Antonio, Gapan, San Quentin, Santa Maria, and San Nicolas, which places are attended by the surgeon of the nearest station. I have recently recommended that an acting assistant surgeon be sent to San Antonio, and also one to Gapan. Santa Maria and San Quentin are only occupied by half a company of troops each, and San Nicolas is only 3 miles from Tayug. San Luis is easily reached from Candaba by a daily boat on the river.

Personnel of the medical department.—There are 4 regular commissioned medical officers in the district, 1 volunteer, and 10 acting assistant surgeons. Under recent orders each one-company post will have 3 hospital corps privates, the large posts being proportionally supplied.

Supplies.—As a large number of the garrisoned towns will be cut off from all communication during the approaching rainy season it has been necessary to take every precaution to see that full medical supplies for six months should be on hand at every post. My predecessor gave the post surgeons warning months ago in the matter, and I have personally inspected the posts and the amount and character of their medical supplies, and caused requisitions to be made for all lacking articles at once. As the requisitions have always been filled and forwarded by Lieutenant Fauntleroy, acting supply officer for the department, with the greatest possible promptitude, I believe that the rainy season will pass with the least possible amount of suffering to the sick, considering the manifestly disadvantageous circumstances. Attention has also been given to the matter of commissary sales stores for use with the sick, as well as clothing for the well, during the rainy season.

Hospitals.—The hospitals of the numerous small posts are located in native houses of the usual style, and are adequate, though not luxurious in appearance. The contemplated extensions will give the district a very respectable hospital at headquarters at San Isidro.

Character of attendance and administration.—There is a notable improvement in the class of men enlisted for the hospital corps of late. The acting assistant surgeons employed differ a good deal individually in attainments, the average being good. The hospitals are generally quite well administered, and these gentlemen are gradually beginning to understand our system of paper work.

Transportation of wounded.—The work of the troops in the district having mainly been in the mountains where the trails are too rough and the turns too short for travois, the wounded have had to be brought out of the mountains by hand—a task of great difficulty. A litter of bamboo poles, with a horse hitched between the front ends of the poles and two men carrying the rear ends, was used in the foothills by Lieutenant Mitchell, Thirty-fourth Infantry, in bringing in wounded on one occasion. The strain upon the bearers is said to be very exhausting. A one-horse litter would seem to be best adapted to the service, although even this can not be used in the wild mountain country owing to the thickness of the growth.

Sanitation.—The sanitary condition of the troops is in general as good as the circumstances will permit. The dry earth-system has replaced the pits for latrines for the rainy season. The food is satisfactory, as also the cooking. All but the most remote posts have had fresh meat two or three times a week. This will not be possible during the rainy season. Some weevils have been noted in some of the sacks of flour.

Prevailing diseases.—The prevailing diseases are dysentery and malarial fevers. The summer months seem to be the worst season for the former affection. Last year dysentery almost disappeared about the month of October, from which time until well into December the rate of ineffectiveness from malaria was very high. Drinking water is boiled or sterilized all over the district in garrison, but as the men are constantly on detached service, they necessarily drink a large amount of unboiled surface water, which may account for the prevalence of dysentery. I do not know that my opinion, that the disease is most prevalent in the early part of the rainy season, is borne out by common experience. That malaria is worse just after the rains have ceased is a well-known fact.

Vaccination.—Vaccinators have been employed in all the garrisoned towns. Where compulsion in the matter has been used large numbers have been vaccinated, but the majority of the natives seem opposed to it and an order will soon be issued by the district commander directing that the native police be used to aid the vaccinators.

Conduct in action.—Acting Hospital Steward Walter K. Barnes, United States Army, will be recommended by the district commander for a certificate of merit for gallantry in attending the wounded under heavy fire during fighting with insurrectos in the mountains June 3 and 5, 1900.

First Lieut. Douglas F. Duval, assistant surgeon, United States Army, and acting assistant surgeon Walter C. Chidester have both acquitted themselves with credit under fire in recent affairs with insurrectos.

REPORT OF MAJ. HENRY F. HOYT, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON FIFTH DISTRICT, DEPARTMENT OF NORTHERN LUZON, MADE TO THE CHIEF SURGEON OF THE DEPARTMENT JUNE 19, 1900.

In compliance with instructions from your office dated May 4, 1900, I have the honor to submit report of the medical department of this district from January 1, 1900, to May 31, inclusive.

GEOGRAPHICAL AREA OF ORGANIZATIONS.

Third United States Infantry.—The regiment is stationed along the line of the Manila and Dagupan Railroad from Polo on the south to San Fernando on the north, 2 companies at Hagonoy, 10 miles west of Calumpit, 2 at San Fernando, 1 at Mey Canayan, 1 at La Lombay, 2 at Malolos, 1 at Bulacan, 1 at Luiguinto, 1 at Calumpit, and detachments at Santo Tomas, Polo, Bigaa, and Apalit.

Thirty-second United States Volunteer Infantry.—On January 1, 1900, this regiment garrisoned Angeles, San Fernando, Calulit, Mexico, Santa Ana, Denalupijan, and Orani, P. I. On January 16, 1900, the regiment was ordered to garrison Bataan Province in addition to two towns in Pampanga Province, and is at present distributed as follows: headquarters, band, regimental scouts, and Companies C, D, and G, at Balanga, with detachment of C at Orion, and of D at Pilar; Company A, at Mariveles; Company B, at Orion; Company F, at Samal; Companies E and H, at Orani, with detachment of K at Llana Hermosa; Company I, at Florida Blanca; Company M, at Porac. The regiment is distributed on a line of about 80 miles.

Forty-first United States Volunteer Infantry.—The command arrived in Manila, P. I., January 4, 1900, in very good condition considering the long voyage and the fact that the men were not allowed ashore except at Singapore. There were no casualties en route. On reaching Manila the sick report consisted chiefly of twenty-two cases of parotitis, which were transferred to hospitals in Manila. For a few days after disembarkation the regiment was stationed at Ermita, Manila. During the month of January eight companies, with 2 medical officers, 1 hospital steward, 1 acting steward, and 8 privates, were stationed at Angeles, Mabalacat, Magalang, and Calulit, on or near the Manila and Dagupan Railroad; the other four companies, with headquarters and band, with 2 medical officers, 2 stewards, and 4 privates, were stationed at various points along the north line of defense of Manila, from blockhouse No. 5 to El Deposito. In February these four companies and headquarters took station along the railroad and from February 5 to May 31 have occupied the following stations: Angeles, Calulit, San Fernando, San Pedro, Magalang, Mabalacat, Calumpit, Bacalor, Guagua, Santa Rita, Sexmoan, Lubao, Mexico, and Santa Ana, and are, May 31, 1900, occupying all the above stations with the exception of San Fernando and Calumpit.

Thirty-fifth United States Volunteer Infantry.—For the whole of the period mentioned the regiment has occupied that portion of the province of Bulacan embraced within lines drawn from San Miguel de Mayumo to Biacnabato, thence to Norzagaray, to Santa Maria, to Quingua, to Pulilan, to Baliuag, to San Ildefonso, and thence to San Miguel de Mayumo. Headquarters, First Battalion, and band have been stationed at Baliuag, the Second Battalion at Norzagaray, Angat, Quingua, and Santa Maria, and the Third Battalion at San Miguel de Mayumo and Pulilan. Detachments from the several companies have been stationed at San Ildefonso and Biacnabato. The territory included within these lines and adjacent country outside have been well covered by scouting detachments from the posts.

Mobile organizations.—Troop H, Fourth Cavalry, stationed at San Rafael; Troop F, Fourth Cavalry, at Norzagaray; Battery E, First Artillery, and Burr's scouts at Angeles, and the Macabebe scouts at Macabebe, but only part of the time with this command.

MEDICAL ADMINISTRATION FEATURES.

Third United States Infantry.—In the management of the medical affairs of this regiment there are no features worthy of special note.

The numerous stations garrisoned by the Third Infantry and the number of medical officers on duty render the efficient direction of affairs more difficult than if the command were concentrated; the latter would enable me to personally supervise much of the work which, under existing conditions, must necessarily be done on paper. My professional duties, in addition to other duties required of a medical officer, render frequent or protracted absence from my station for the purpose of inspection impossible. The work, however, is progressing in a fairly satisfactory manner.

Sanitation: The work of cleaning the towns garrisoned by the Third Infantry has progressed in a most satisfactory manner considering the nature of the country and the accumulated filth of years, due to the customs and habits of the people.

Water: Good quality, and while many reports of its questionable potability have passed through this office and samples have been sent to Manila for analysis, no report of its evil effects on the men has come to my notice. As far as possible all water used for drinking purposes is boiled and filtered. Water at San Fernando is obtained from an artesian well, located near railroad station, and is of excellent quality.

Fæces: Latrines emptied daily where they are in use and contents buried.

Slops: Removed daily and disposed of as above.

Sleeping arrangements: Troops are comfortably quartered in good buildings, except at Guiquinto and Bigaa, where detachments of Company L are living in tents. Numerous outposts also occupy tents, but these details are subject to frequent changes.

Food: Abundant and of good quality.

Cooking: Good.

Efficiency of the medical officers and hospital corps: Fair.

Thirty-second United States Volunteer Infantry.—There is a regimental medical officer stationed with each battalion. The surgeon with headquarters and first battalion, the captain and assistant surgeon with second battalion, and the first lieutenant and assistant surgeon with third battalion. Reports are rendered daily to the surgeon's office by telegraph, except from Mariveles, which has no telegraphic communication. The surgeon, in addition to Balanga, visits Pilar and Abucay, where no medical officers are stationed. The assistant surgeon at Orani visits Samal and Llana Hermosa, and the assistant surgeon at Florida Blanca visits Porac. The surgeon, as far as he can, inspects the garrisons of the regiment, but owing to the fact that there is no available medical officer to relieve him, this is not done as often as desired. All requisitions for supplies are sent through the surgeon's office.

Sanitation: Towns are inspected by surgeons and post commanders, and natives required to keep yards and streets clean. Towns garrisoned by this regiment are in good sanitary condition at present, and improvements are being made. Quarters are regularly inspected by the surgeons.

Water: Water is as far as possible obtained from rivers and running streams and is boiled and filtered. The water from the rivers and mountain streams is excellent in quality.

Fæces: Sinks are located at the proper distances from the quarters, and the fæces are kept constantly covered with dry earth. Where possible they are located over rivers which are not used for water supply. Dry-earth closets have been recommended for the rainy season where river sinks are not available.

Slops: Garbage is burned, and slops are dumped in river where possible or burned.

Sleeping arrangements: Excellent. The regiment is supplied with cots and the quarters are at least 5 feet above the ground.

Food: Supply good and sufficient. Fresh meat is supplied three times a week from Manila, and bakeries are being built at the principal garrisons.

Cooking: Companies are well supplied with good cooks and the facilities for cooking are excellent.

Any other matter pertaining to the health of the command: Men are kept out of sun as much as possible between the hours of 11 a. m. and 4 p. m. Company commanders have received instructions to have men take care of their feet and bathe them and change stockings often. Bathing facilities in running water are good.

Forty-first United States Volunteer Infantry.—About March 1 regimental hospitals were established as follows: Angeles—headquarters, 16 beds, afterwards increased to 40 beds; Guagua, 10 beds; San Fernando, 10 beds; and emergency hospitals at Calulit and Santa Ana, 5 beds each. Native houses were used for hospitals. Until about May 1 all serious cases, such as typhoid and contagious diseases, were sent to other hospitals, mostly to Angeles. Since that time owing to the increased capacity of the regimental hospital at Angeles and the more or less permanency of stations, nearly all cases are treated at regimental headquarters. Morning report for May 31 shows absent sick, 23; present sick, quarters, 40; hospital, 49.

Medical supplies: Medical supplies, in addition to those brought from Camp Meade, Pa., have been obtained mostly from subsupply depot at Angeles and with comparative promptness in filling requisitions.

Water: The water supply at the various stations has been variable. At most of the stations it has been obtained from wells and has been of doubtful quality. At San Fernando good water was obtained from an artesian well. At Guagua the water supply has been especially poor. The water from the local wells was brackish and could not be used. Water was brought from San Fernando, but this was found impracticable and the supply had to be obtained from a stream several miles distant and brought in bancas. At all the stations the greatest precautions have been taken to boil and filter the water. Guagua has two "Waterhouse-Forbes sterilizers," and Angeles one, which give good satisfaction.

Fæces: Earth pits have until recently been used for disposal of fæces, being covered twice daily.

Slops: Were disposed of in like manner. Zinc latrines are now chiefly used with removal of contents twice daily.

Sleeping arrangements: The men all have cots.

Food, cooking, etc.: The food has generally been excellent; its cooking variable, depending on the efficiency of the company cooks.

Thirty-fifth United States Volunteer Infantry.—The three regimental medical officers have been stationed, respectively, at Baliuag, San Miguel, and Norzagaray, with detachments of the hospital corps proportional to the needs of the posts. We have had no trained nurses. When Companies G, H, and M established posts at Quingua and Pulilan January 22 and 26, Acting Asst. Surg. Edwin N. Bowen was assigned to duty with these commands. Subsequently (March 18) Company G removed to Santa Maria, and on May 4 Acting Asst. Surg. Leonard P. Bell was assigned to duty with it. The regimental surgeons and the two acting assistant surgeons are the total medical officers now with the command. The hospital corps personnel has embraced the 3 regimental hospital stewards, 3 acting stewards, and an average of 22 corps privates. At the present time 2 acting stewards and 1 private are on detached service, 1 acting steward and 3 privates are sick in hospital. Field hospitals have been in operation at Baliuag, Norzagaray, San Miguel, and Quingua. Sick men from other stations have been sent to these hospitals for treatment. These have been well provided with medical and other necessary supplies.

Medical supplies were formerly obtained by requisition of medical officers at separate posts direct upon the chief surgeon of the department, Manila. After receipt of instructions that this be changed they have been obtained upon requisition of the regimental surgeon for the entire command, and subordinate medical officers have received their supplies from this officer at Baliuag.

As to the transfer of sick and wounded to other hospitals, the instructions contained in Circular No. 6, Headquarters Second Division, Bautista, January 22, 1900, have been generally observed. From the regimental hospitals patients have been transferred to the field hospital, Angeles, or the base hospital, Dagupan, and occasionally to the First Reserve Hospital, Manila, when the nature of the case rendered this advisable, the necessary authority in the latter case being previously obtained. Cases of typhoid fever, remittent malaria, malarial anæmia, chronic diarrhea and dysentery, surgical affections of the rectum or genito-urinary organs, and surgical cases needing special operation have been sent to the hospitals above named.

The sanitary condition of the buildings used for hospitals has been satisfactory. Before being occupied the rooms and halls were thoroughly scoured and old water-closets cleaned and disinfected and in some cases closed up. The hospitals have been daily policed and kept in good condition.

Drinking water has been obtained from the rivers passing San Miguel, Norzagaray, Baliuag, and Quingua. The water is always boiled before using and generally filtered, the Army field filter, the Maignen filter, and an improvised filter of sand and charcoal being employed.

The hospital fæces and slops have been either carted off to the river along with similar refuse matter from other premises of the garrison and deposited below the point where the drinking water is obtained or they have been disposed of in large earth pits dug in the rear of hospitals to receive them. The deposits in these sinks have been daily covered with dry earth and chloride of lime when required.

Each hospital has had a sufficient number of cots (wire or canvas) for the patients usually on hand. The quantity of bedding has been ample.

Patients unable to use the regular ration have received the benefit of the 40 cents per day allowance for the sick. This allotment has been found to be quite sufficient. The average cost of subsistence for the sick in hospitals has been about 36 or 37 cents per man per day. The kitchens have had all necessary utensils, and cooking facilities have been satisfactory.

POST AND CAMP HOSPITALS.

Third United States Infantry.—Post hospitals have been established and modestly equipped by all medical officers on duty with the regiment; only such cases as require special treatment are transferred to general hospitals. Each medical officer has been provided with two hospital tents complete and held in reserve to be used in case of emergency, ambulances in good condition, and an abundant supply of medicines and surgical dressings.

Thirty-second United States Volunteer Infantry.—The regimental hospital is situated at Balanga, and has a capacity of 16 beds; Second Battalion hospital at Orani, capacity 12 beds; Third Battalion hospital at Denalupijan, capacity 10 beds; company hospital at Florida Blanca, 6 beds; company hospital at Orion, 6 beds; and company hospital at Abucay, 4 beds. The buildings are in good repair and furnished with cots, and in some places mattresses; all have blankets, mosquito bars, pillows, pillow cases, sheets, and all other necessaries for the comfort of the sick. Each post has a building suitable for isolation of contagious cases. Special diet is obtained from the commissary at the different posts.

Forty-first and Thirty-fifth United States Volunteer Infantry.—See under "Medical administration features."

Fourth United States Cavalry.—Has camp hospital at San Rafael.

Battery E, First Artillery, and Burr's Scouts have no camp hospital; all cases are sent to field hospital, Angeles.

MEDICAL SUPPLIES.

Third United States Infantry.—Obtained by requisition on medical supply depot at Angeles; fair supply on hand.

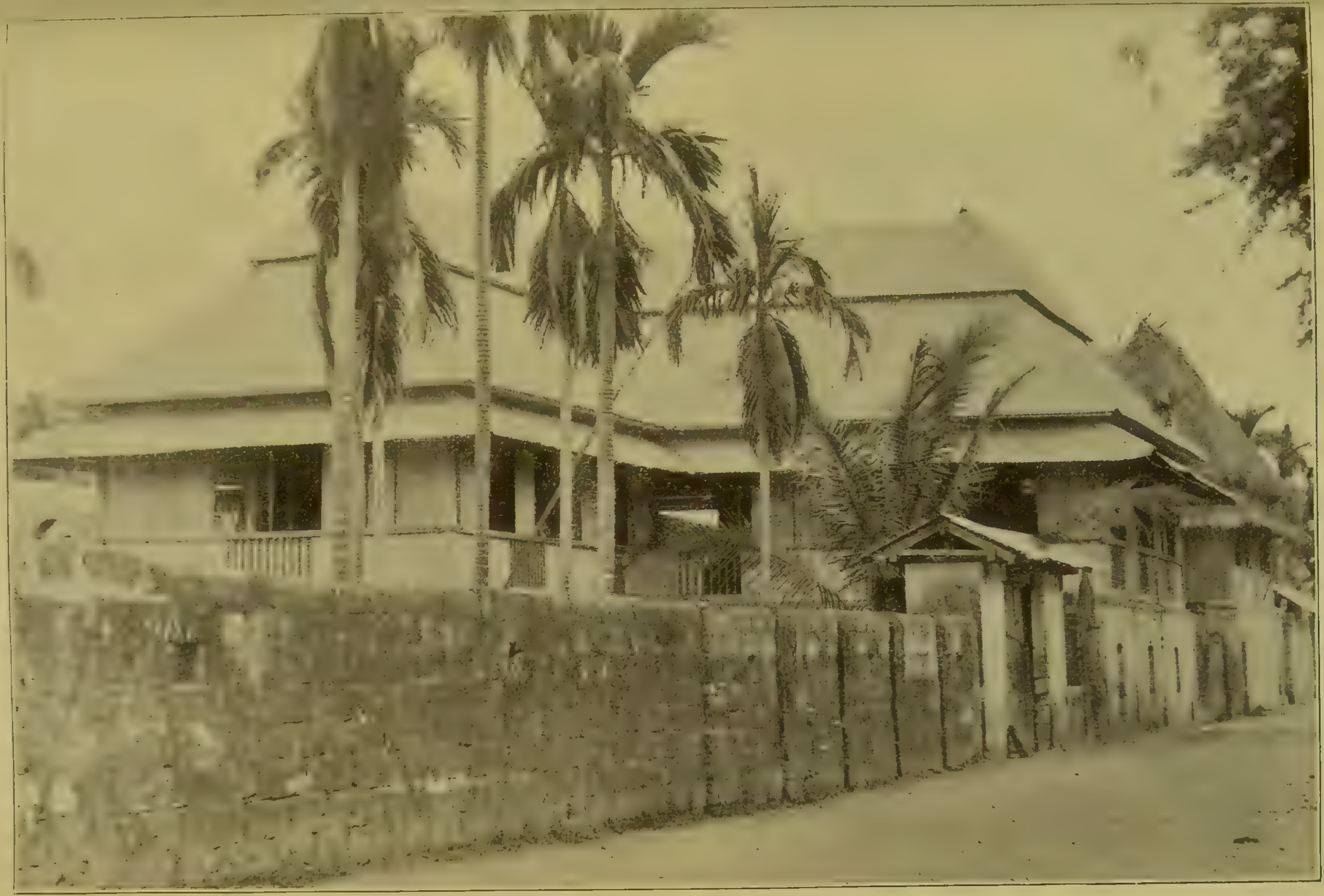
Thirty-second United States Volunteer Infantry.—Good supply on hand for the rainy season. Each surgeon is furnished with all the instruments necessary for performing operations required in the field and in regimental and battalion hospitals. Supplies for all stations in the province of Bataan are shipped direct from supply depot in Manila to regimental hospital at Balanga, where they are packed and shipped to the different garrisons. Supplies for Florida Blanca and Porac are furnished and shipped direct from Second Division hospital at Angeles on requisitions from the regimental surgeon.

Forty-first United States Volunteer Infantry and Thirty-fifth United States Volunteer Infantry.—See "Medical administration."

EFFICIENCY OF DEPARTMENT AND SPECIAL MENTION OF DESERVING MEMBERS.

Third United States Infantry.—Knowledge of administrative duties and paper work among medical officers poor, but improving.

Thirty-second United States Volunteer Infantry.—Standard of efficiency of medical officers serving with this regiment is very high. While many of the men have served scarcely a year in the hospital corps, they have rapidly acquired a knowledge of their duties and have rendered excellent service. Knowledge of administrative work good; knowledge of paper work is fair; efficiency in that direction is increasing. None of the medical officers had any experience in paper work prior to the Spanish-American war.



HOSPITAL THIRTY-FIFTH VOLUNTEER INFANTRY, BAULIUAG, LUZON.

Particular attention and devotion to duty displayed by the following members of the hospital corps in nursing and caring for smallpox cases at this place from February 28 to March 23, 1900: Hosp. Stewards Benjamin Hanson and Theodore F. Knapp and Privates James F. Hammer, hospital corps, and Francis L. Baldwin, Company C, Thirty-second United States Volunteer Infantry, then a convalescent patient in the hospital, and by the following members of the hospital corps in nursing and caring for smallpox cases at this place from April 9 to 15, 1900; Hosp. Steward Theodore F. Knapp and Privates James F. Hammer, Hugh S. Longbottom, and Charles Walsh.

Coolness and systematic action displayed by the following members of the hospital corps in the placing of patients under protecting cover and preparing instruments, dressings, and operating table for immediate use while the regimental hospital was being fired on from different points, in attack on Balanga, April 8, 1900: Hosp. Stewards Hanson and Knapp, and Privates Adam Chart, James F. Hammer, Hugh S. Longbottom, and Charles Walsh.

Hazardous service performed by Hospital Steward Benjamin Hanson, in removing bodies of killed American soldiers from the field, in an ambush made by the insurgents about 4 miles west of Orion, P. I., April 11, 1900.

Coolness and systematic action displayed by Acting Hospital Steward Ivan N. Karlson and Private Harry W. Hutchinson during an attack on Abucay, P. I., May 25, 1900. Acting Hospital Steward Karlson participated in engagement at San Luis, May 17, 1899, at Paranaque, June 10, 1899, at Zapote Bridge, June 13, 1899, and at Bamban, November 11, 1899. Private John Plant participated in engagement at San Luis, May 17, 1899, and at San Fernando, August 9, 1899. Private Charles Walsh participated in skirmish in the foothills about 4 miles northwest of Abucay, May 16, 1900.

Forty-first United States Volunteer Infantry.—The medical officers now on duty with the regiment number 5, in addition to the regimental surgeon, and are all efficient and have shown a willingness and cheerfulness in the performance of their duties. Acting Asst. Surg. John J. Gilhuley, on duty with the Forty-first since January 14, 1900, was especially commended by General Grant for attention to wounded in engagement near Mount Aryat. The hospital corps personnel now numbers 3 hospital stewards, United States Volunteers, 2 acting hospital stewards, and 26 privates. Marcus H. Heldman, the senior, formerly acting steward United States Army, is thoroughly competent and familiar with routine work. The other two were enlisted directly from civil life, and while not as efficient as the senior member are zealous in the performance of their work. The two acting stewards are both most excellent men, competent to fill positions as full stewards of volunteers. The privates are, some excellent, some fair, and others poor. The efficiency of most of them has been excellent, considering the limited time and opportunity they have had for instruction, and although they have had no opportunity to display their efficiency in first-aid action yet, at the post, in the ward, and at any other duties assigned to them at the hospital they have displayed knowledge and willingness to do their part. Private Walter F. Callahan, in an engagement on February 2, 1900, in which one man was mortally wounded, improvised a litter of his own clothes and transported the patient very carefully and ably. Private George D. Dersh, having been put in charge of a smallpox patient, nursed him bravely and carefully to the end.

Thirty-fifth United States Volunteer Infantry.—Medical officers and members of the hospital corps have been efficient, and, as a rule, attentive to their duties. Recently the hospital corps has suffered several losses by transfer, assignment to duty on detached service, transfers by sickness, and one discharge by general court-martial, without corresponding gains, so that for months past the working strength of the corps has been at a minimum.

Medical officers have shown good knowledge of their administrative duties and paper work, barring occasional errors due to inadvertence or to misunderstanding of instructions. The writer believes that faithful efforts have been made to keep the paper work up to date and to forward the periodical reports at the proper times.

Since January 1 the only actions in the field have been unimportant skirmishes between small scouting detachments of troops and bands of roving insurgents or ladrones. These scouting parties have generally been accompanied by one or more members of the hospital corps, a hospital steward, or one of the surgeons. Men taken sick or wounded in the field have been removed by the corps attendants or their comrades to the nearest hospital for treatment, and after recovery they have been returned to their proper commands. So far as the writer is aware, there have been no noteworthy incidents of personal bravery or hazardous service on the part of the medical officers or members of the hospital corps. Opportunities for distinguished service of this kind have been lacking. There are three serviceable ambulances with the regiment.

PREVAILING DISEASES.

Third United States Infantry.—Since joining the regiment February 10, 1900, nothing more serious than the ordinary intestinal troubles—diarrhea, acute or chronic, and dysentery of a mild type—malarial fever, apparently recurring in men who had seen service in Cuba and were exposed more or less to favorable conditions for its redevelopment, and with my immediate command an unusual amount of venereal diseases. As to the intestinal troubles, no one cause can be held entirely responsible for their production. Indiscretion in eating, especially the various tropical fruits, no doubt is responsible for a major part of the acute diarrhea. Dysentery, in all probability, is largely due to the wide variations in temperature, night and day, and fatigue diminishing the resisting power of the tissues and allowing infection to take place. Mild cases, catarrhal form, are no doubt a continuation of a neglected acute diarrhea. The regiment at the present time seems particularly free from any serious intestinal troubles, except several cases which have continued on to the chronic state, and, in my opinion will not recover in this climate under the present conditions. Of malarial fevers and venereal diseases, opinion as to the cause is not necessary. Of the acute infectious diseases, one case of smallpox developed at Malolos in February, was transferred to Second Division hospital, Angeles, and died there three days later. The entire command at that post was revaccinated. No other case developed. With this exception the regiment has been entirely free from this type of disease. The command has been affected with the usual amount of dhobie itch and sore feet. Several cases of hernia have been transferred for operation.

Thirty-second United States Volunteer Infantry.—Malarial fever has been the prevailing disease; dysentery and diarrhea have been next in order. In January dhobie itch was prevalent, but it has diminished of late. Diarrhea has probably been caused by overeating of fruit and, especially on marches, by drinking water that has not been boiled and filtered. The same may be said in regard to dysentery. Malaria here is caused by the large amount of territory subject to tide water. After the ebb the ground is covered with rank decaying vegetation. The cases of smallpox were caused by the fact that there were quite a number of native children affected with the disease during February and March. The command has been repeatedly vaccinated and all but one of the soldiers affected had good scars.

Methods of caring for sick and wounded in the field, especially during action: A hospital corps man is sent with each scouting party or detachment, supplied with necessary first-aid packets, medicines, instruments, and the men are furnished with first-aid packets. Each company is supplied with litters. A medical officer accompanies the larger expeditions. There are ambulances stationed at each post, except Pilar, Samal, Llana Hermosa, and Mariveles, but they are only available short distances from the main road, owing to the character of the country. Sick and wounded are brought to the nearest ambulance station and from there transported to the nearest hospital.

Forty-first United States Volunteer Infantry.—The most prevalent disease has been malaria, both pernicious and benign. In reference to the cases of malaria I wish to call attention to the great value of hypodermic medication. I have used this method exclusively and with the most gratifying results; many of the cases were apparently hopeless when first seen. I do not think this method has received the consideration it deserves by the majority of the medical officers on duty in the Philippines. In my opinion much of the dysentery and diarrhea, diagnosed as such and treated purely as such, are cases of pernicious malaria in which blood examinations would reveal the nature of the trouble and in which treatment hypodermically for malaria would cause the disappearance of the dysentery or diarrhea. I have observed this condition in so many cases that it can hardly be mere coincidence. My only plea for this digression is to emphasize the great importance of blood examinations in all cases of dysentery and directing the treatment to the probable cause, malaria. Except as above stated as coincident with pernicious malaria there has been comparatively little dysentery and diarrhea. When speaking of pernicious malaria, I use the term in the broad sense of cases in which the malignant parasites are found and not in the very restricted sense of acute attacks, such as cerebral.

Thirty-fifth United States Volunteer Infantry.—The prevailing diseases have been malarial fever, diarrhea, and dysentery, acute and chronic. Typhoid fever has not occurred to any great extent. The round worm (*Ascaris lumbricoides*) has been noted among the men with greater frequency than one expects to find in an adult population. No smallpox case has occurred among the troops. Venereal disease has been comparatively infrequent.

Malarial disease (intermittent, remittent, pernicious, and cachectic) has constituted 48 per cent of the cases in hospital and quarters at Baliuag, 51 per cent at Norzagaray, 62 per cent at Quingua, and 71 per cent at San Miguel. The intermittent tertian type has predominated. The cause doubtless is to be found in the season and in the necessary exposure to the sun on the march. January, February, March, and April, I am informed, are the months of the greatest prevalence of malarial disease in the Philippines. Exposure to the heat and the injudicious use of drinking water from native wells or shallow streams while on march have doubtless been important factors in the production of malaria, the diarrheas, and the few cases of typhoid fever.

DEPARTMENT OF SOUTHERN LUZON.

REPORT OF MAJ. J. L. POWELL, SURGEON, UNITED STATES ARMY, CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED MANILA, JUNE 1, 1900, AND ADDRESSED TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES.

In response to letter from your office of April 12, I have the honor to present a report of the operations of the medical department of the First Division, embracing the period from January 1 to May 30, 1900.

Practically the narrative begins on January 4, when Maj. Gen. J. C. Bates assumed command, in consequence of the death of the lamented Lawton. At this time the division numbered approximately 23,000 men, the greater portion of which was resting in camp after the severe ordeal through which it had passed in the campaign that had just come to a close in the northern and central portions of Luzon. Preliminary steps had already been taken for the mobilization, equipment, and concentration of an expeditionary force of six regiments of infantry and two of cavalry for the invasion of the southern provinces of Cavite, Laguna, Batangas, and Tayabas, territory that up to this time had been in exclusive possession of the insurgents. The advance column under Brigadier-General Schwan, consisted of the Thirtieth and Forty-sixth Infantry, nine troops of the Eleventh Cavalry, and five troops of the Fourth Cavalry. What was termed the marching column was commanded by Brigadier-General Wheaton, and was composed of the Fourth, Twenty-eighth, Thirty-eighth, and Forty-fifth Infantry.

The administrative features of these two commands during the active stage of the expedition were among the most important that have taxed the resources and energy of the medical department, individually as well as collectively, and in the results achieved have demonstrated its capacity to meet almost any emergency, while out of it all have been derived most valuable lessons for application upon future occasion.

To Schwan's column was assigned Maj. H. S. T. Harris, United States Volunteers, as brigade surgeon. Maj. Ira C. Brown, United States Volunteers, was the brigade surgeon of Wheaton's command; but it had hardly gotten into motion when Brown was relieved for other duty and Maj. H. P. Birmingham, surgeon, United States Army, assigned to the vacancy.

Seven four-mule ambulances were ordered to report for duty with the advance column, six with the marching column.

Every effort was made at this office to insure the complete equipment for each regiment or fractional part thereof when operating independently, as to medical and surgical appliances and personnel of surgeons and hospital corps men prescribed by existing orders and regulations and the Manual for the Medical Department. A supplementary force of twelve Chinos to each regiment was employed as additional litter bearers, and well they served their purpose, especially when wheel transportation was impracticable, which was constantly the case, owing to the impassable roads and difficult character of the country in the theater of operations. But the regiments were seldom handled as a unit, the detached parts being often separated by long distances, making it the more difficult to divide up in a way to meet every contingency a complement of medical officers, medical and surgical equipment, and personnel of the hospital corps, that under ordinary conditions would have been fully adequate for any exigency.

None of the prescribed classical or tactical dispositions were in any way applicable, but every movement, great or small, brought along with it its quota of sick, wounded, or exhausted, and furnished an extemporized basis, so to speak, for the exercise of every faculty of ingenuity possessed by the surgeons and hospital corps men in improvising measures to care for the disabled and to transfer them to some place of safety. In the majority of instances where engagements occurred the sole means immediately at hand for meeting the demands of the casualty list was limited to the hand stretchers or litters, the hospital corps and orderly pouches and the first-aid packages, and such other small quantities of dressings and essential medicines as could be taken on the persons of the Chinos or hospital corps men, but even with this limited equipment no notable instance of suffering was recorded, and in due time all cases requiring protracted medical or surgical treatment were conveyed to eligible points, many of which eventually became sites of hospitals, regimental or base, of more or less permanence, according to the suggestions of the military situation.

Suitable buildings were to be found in most of the towns. There is scarcely one of any size without its convent, and this in most instances being well adapted for hospital purposes, was invariably used as such. In this way, as the insurgents were driven out of the provinces cited and our troops took up permanent locations, each station soon found itself possessed of a hospital fully equipped for every necessity.

The base hospitals designated from this office were located on the lake shore and on the seacoast. Of these there are Calamba, on the Laguna; Bacoor, Batangas, and Lucena, on the seacoast. They all constitute a base of medical supplies for the interior stations, and each surgeon in charge is to this extent a supply officer.

The Calamba Hospital dates from February 3 last, and the history of its inception is embodied in the report of an inspection made by me to the adjutant-general, First Division, Eighth Army Corps, April 4, 1900, a copy of which I had the honor of forwarding at the time, by your request, to your office. It is admirably equipped, well situated from a military point of view, and can be expanded to accommodate about 200 patients, though at this writing there are about 170 cases. It has a competent force of hospital corps men and eight trained female nurses. Maj. George H. Penrose, brigade surgeon, United States Volunteers, is in charge. Bacoor, originally a small brigade hospital, is the focal point for the commands in Cavite province, as is Calamba for Batangas, and was established by Major Penrose about July, 1899. It has, however, been enlarged and improved, and, like Calamba, is equipped for any sort of cases, medical or surgical. It, too, is a transformed convent building, and is now in charge of Maj. W. P. Kendall, brigade surgeon, United States Volunteers. Farther down the seacoast is Batangas, situated across the neck of land about 40 miles from Calamba. It is a sort of combination regimental and base hospital, and Maj. J. D. Glennan, surgeon, Thirty-eighth Infantry, is in charge. A municipal building has been fitted up for a hospital, and there is ample storage room for supplies. At Lucena is a hospital alike in character to those described, and although but recently established it is assuming a shape under the management of Maj. J. R. McDill, surgeon, Thirtieth Infantry, that will make it equal in importance and efficiency to those that have been mentioned. At Santa Cruz, on the Laguna, is also a combination regimental and base hospital, which is admirable in all its appointments, and is under the efficient administration of Maj. F. A. Winter, surgeon, Thirty-seventh Infantry. It is a good type of a number of buildings at other places that are used for similar purposes. For a more detailed description of it I refer to Major Winter's report and to the photograph that accompanies it.

At all interior stations where troops are located, as at Tayabas, Lucban, Majayjay, San Jose, Lipa, Taunaun, San Pablo, Santo Tomas, Indan, Silang, Dasmarinas, Imus, and many other points with small garrisons or detachments, provision is made for the proper care of the sick and wounded. The equipment in these instances ranges from a mere dispensary, with an acting hospital steward or private of the Hospital Corps, to a complete regimental outfit, its proportions being determined by the size of the command, its distance and accessibility to some more central, amply supplied, and fixed strategical point. The number of sick and wounded at these interior hospitals is limited by orders from this office, the overflow being taken by ambulances to the bases, from which again, in case of crowding, they are brought by water to the hospitals in this city. In anticipation of the rainy season, when land transportation for wheeled vehicles is almost out of the question, medical officers at stations likely to be permanent were ordered to prepare requisitions covering a period of six months, and to have the stores on hand by May 15. This was done according to order.

A comparative state of repose was beginning to succeed the active hostilities that had prevailed in that section, and the troops were settling themselves in more or less permanent abiding places, when another demand was made upon the First Division, Eighth Army Corps, for an expeditionary force, destined for the suppression of insurrectionary demonstrations in the Camarines, a province near the southern extremity of the island of Luzon. This was composed of the Fortieth and Forty-fifth Infantry, and Company G, Thirty-seventh Infantry, with four mountain guns and a detachment of engineers, taking its departure from Manila on February 15, and going by sea to its destination. This brigade was under the command of Brig. Gen. James M. Bell, United States Volunteers, and was known as Bell's Expeditionary Brigade. Arriving in the bay of San Miguel on the east coast of the island, a combined movement was made resulting in the landing and quick possession of the country bordering on the bay, and with the loss of 1 officer killed and about 10 men wounded, reports of which were forwarded in due course to your office.

Maj. Thomas U. Raymond, United States Volunteers, was surgeon of the Fortieth, and Maj. M. W. Ireland, United States Volunteers, of the Forty-fifth Infantry, both men of experience, ability, and energy. Their equipment was limited to the prescribed allowance for troops operating in the field, but it was ample, as a six months' supply was issued. Major Raymond being the ranking officer, assumed the duties of brigade surgeon, and while he was in charge performed them with zeal and excellent judgment. While the number of surgeons and hospital corps men designated to accompany this column was considered sufficient to meet every requirement, the rapid multiplication of small detached commands in the territory in point made the demand for divided medical attendance far in excess, not only of the regulation allowance, but of the additional supernumerary force that it was deemed expedient to assign to duty with the command. The scattering military operations by small bodies of men have created a call for surgeons which it has been impossible in every instance to meet, and there is every indication that as the troops become more permanently located the numerous encampments will increase rather than diminish the already existing necessity for an addition to the number of surgeons which have been allotted to this military department.

At Nueva Caceres the nucleus of a brigade hospital was started by Major Raymond, but in the absence of any wire communication with these headquarters, and owing to the length of time it requires to communicate by sea, it is impossible to keep pace with the daily progress of events in that district. The conditions are about the same, however, as those that existed in Cavite, Laguna, Batangas, and Tayabas, and by a process of evolution the organization and equipment of the medical department in the Camarines will in time, no doubt, settle upon about the same lines as those now prevailing in those provinces.

On March 20 the Fortieth Infantry was relieved from duty in the Camarines and sent to the island of Mindanao, the Forty-seventh Infantry taking its place, and between April 23 and June 1 two squadrons of the Eleventh Cavalry, which had been stationed in the province of Cavite, were added to the force commanded by General Bell.

Sanitation and health of the command.—Every possible precaution has been taken by the medical department looking to the preservation of the health of the troops of this division. Medical officers have been enjoined from this office to familiarize themselves with the instructions on camp sanitation contained in the Manual for the Medical Department of the Army, edition of 1899, and to be more than ordinarily persevering in their recommendations relative to the boiling of all drinking water and the care of the sinks.

Where instructions embracing almost every duty of administration and others that properly come within the province of the army surgeon are so complete, and embodied in such concise and convenient form as they are in this little manual, it has been thought the work of publishing from day to day a multitude of orders and circulars from the office of the chief surgeon of the division, expressing about the same thing, would be nothing less than superfluous; and to the end that simplicity, which is believed to be the wisest and best mode in the attainment of every end, might be preserved, it has been the endeavor to place in the hands of every medical officer of the division one of these little books. To in a measure reenforce the manual as to special conditions existing in the Philippines, the chief surgeon of the Eighth Army Corps prepared a most admirable circular (13), which was published from headquarters of the department on February 22, 1900.

With these two, it is believed that nothing has been left undone to educate the most inexperienced among the medical officers of the command to a full appreciation of their responsibilities and to a proper performance of their duties, administrative as well as professional. To each of them was addressed the following letter, dated March 7, 1900, accompanied by the circular cited:

"The inclosed circular is for your information and guidance. Its provisions in every particular will be strictly complied with. In conjunction with the Manual for the Medical Department of 1899, a copy of which can be obtained on application at this office, it should be made the *vade mecum* of every medical officer of the division, and no departure from the instructions and regulations embodied in the two will be permitted to pass unnoticed. Upon receipt of the circular you will at once report the fact by wire to this office."

But withal, the effort to prevent an outbreak of typhoid fever at certain points has not been entirely successful. At Paete, on the lake shore, in the province of Laguna, where there was one battalion of the Forty-second Infanty, it made its appearance in the latter part of March, and soon assumed the proportions of an epidemic. In all about 23 cases were verified by the Widal and other tests, but it is gratifying to report that by the application of vigorous sanitary measures, which unhappily appear to have been neglected too long, its progress was quickly checked, and at this writing, June 1, the command is practically free from the disease. A beautiful mountain stream near which the troops were located and from which water for all purposes was obtained, courses through the village, and by its clear and sparkling features, was suggestive of great purity, a fact that put both officers and men off their guard, and was the cause of a neglect to subject to the boiling process all the water used for drinking purposes. It was discovered that this stream passed by some nipa huts farther up, and it was suggested that there was the source of infection. But this theory was not susceptible of positive proof and the opinion is held by some with equal reason that the germs of the disease may have been brought from some focal point to which the command had been exposed in the active operations in which they had been engaged just prior to their encampment at Paete.

In addition to the measures adopted to correct the existing evil, two Waterhouse-Forbes sterilizers were shipped to that point for the use of the command. As a precautionary measure a number of these machines have been supplied to other points as well where it seemed probable that the drinking water was not pure and wholesome, but the supply of these machines is not equal to the demand throughout the military department. The whole history of the outbreak proves not only the value and importance of the sanitary measures recommended for the camp by the medical department, but the criminality of those in authority who neglect their enforcement.

At San Pablo, in the province of Batangas, where a battalion of the Thirty-ninth Infantry has been stationed, a serious outbreak of illness has recently occurred among the troops, chiefly of a dysenteric character, although three cases of typhoid fever were verified by Lieut. R. P. Strong, assistant surgeon, United States Army, the pathologist, on a recent visit he made by my request, to the base hospital at Calamba, to which point the sick are transferred from the inland stations in that section. At San Pablo, too, where the same ignorance of or indifference to proper health precautions prevailed, the situation was soon relieved by instructions from this office and the commendable efforts of the district surgeon.

The conditions that prevailed at Paete and San Pablo were the occasion of the following order, framed in this office and recommended to the department commander, by whom it was published to emphasize and enforce the sanitary instructions that had been given to the regimental surgeon by the chief surgeon of the department.

CIRCULAR }
No. 8. }

HEADQUARTERS DEPARTMENT OF SOUTHERN LUZON,
Manila, P. I., May 29, 1900.

Owing to a recent outbreak of typhoid fever and dysentery of epidemic form among the troops at two of the stations in this department, which it is believed was due entirely to the neglect of well-known sanitary measures, the department commander takes occasion to call the attention of commanding officers to the importance, under all circumstances, of exercising a rigid supervision over the water supply, from whatever source obtained. It is known that typhoid fever and dysentery, the great camp scourges, are water-borne diseases, and inasmuch as the germs of the diseases are destroyed or rendered innocuous by a few minutes' boiling, it is ordered that all water used for drinking purposes be subjected to that process and that the use of any other be forbidden.

In order to carry out this measure, a system of daily inspection of drinking water and canteens will be instituted in each company, and the unnecessary use by any member of the company, of unboiled water for drinking purposes will be regarded as disobedience of orders and treated accordingly.

By command of Major-General Bates:

ARTHUR L. WAGNER,
Assistant Adjutant-General.

Diarrhea, dysentery, and the different types of malarial manifestations have been the predominent factors in producing inefficiency and disability in the division, typhoid, the great camp scourge, not figuring, except in the two instances cited, to give alarm or showing any tendency to get beyond perfect control by proper sanitary measures.

Just here I wish to record my approval and commendation of the portable dry earth boxes now issued from the quartermaster's department. As an improvement upon the old-fashioned and opprobrious camp sink, they stand preeminent. They are very light and convenient, and the amount of labor necessary to empty them at proper intervals and keep them clean is small compared with what is required to keep a sink in proper shape as a sanitary device. Besides, the boxes constitute by all odds, a much more effective means from a sanitary point of view of disposing of the excreta.

At stations where it has been practicable to send it, quicklime, in quantities sufficient has been supplied, to be used in such a manner as might be considered most effective.

It is believed that an analysis of the tabular reports will show that the amount of ickness, all things considered, has not been excessive. Smallpox has prevailed here and there, contracted primarily from the natives, among whom it appears to be endemic, but a rigid enforcement of vaccination regulations is required, and in the First Division, now the Department of Southern Luzon, it has been held well in check. With virus obtained from the Manila Board of Health, and purchased out of the civil fund, the medical officers of the command, under instructions from this office, and without making the measure compulsory, are doing most valuable work in extending its benefits to the native population.

The facilities for cooking for the sick while on the march have been primitive, but whenever there was transportation to take them, both food and mess chests have been available, and at every point where there was a stop long enough to justify the organization of a hospital, even on the smallest scale, the 40 cents per day fund for each patient was authorized and purchases made of food from the commissary department, or of articles from the natives, such as eggs, chickens, etc.

Department of Southern Luzon.—The First Division, Eighth Army Corps, continued its official existence up to April 7, 1900. On that date, by General Orders, No. 1, headquarters Division of the Philippines, certain military departments were created and their bounds defined. The Department of Southern Luzon was made to include all the territory from a line drawn east and west across the island a short distance north of the Pasig River to the Straits of San Bernardino to the south, and east and west between the Pacific Ocean and China Sea, including all islands adjacent thereto. By the same order I was assigned to the department as chief surgeon.

The character of the operations that had preceded this division into military departments had been very much in the nature of a "mix up," so that no well-defined lines could be drawn marking off brigades, either by organizations or territorial limitations. In consequence of this there was an unavoidable incompleteness in the organization of the medical department, which made it necessary for nearly all the regimental surgeons to report direct to this office, thus imposing upon it an amount of work and a sense of undivided responsibility by no means light.

It is true that the First Brigade, under Brig. Gen. R. H. Hall, United States Volunteers, owing, it is presumed, to its location and the line it had to guard, preserved its autonomy, but this was the only exception. To this command Maj. W. B. Banister, surgeon, United States Volunteers, had been assigned as brigade surgeon, and the efficiency, zeal, and ability he has displayed in the performance of his duties are deserving of the highest praise.

In natural sequence to General Orders, No. 1, headquarters Division of the Philippines, defining the departments, came General Orders, No. 2, headquarters Department of Southern Luzon, defining the districts with reference to natural boundaries, and assigning certain officers to command. The occasion was opportune for the further organization of the medical department, as expressed in the following order of April 19, 1900, the draft of which emanated from this office:

The following medical officers are, upon recommendation of the chief surgeon of the department, assigned to duty as chief surgeons of the several districts in this department:

To the first district: Maj. W. B. Banister, brigade surgeon, United States Volunteers.

To the second district: Maj. George H. Penrose, brigade surgeon, United States Volunteers, in addition to his present independent duty as commanding officer, division base hospital at Calamba.

To the third district: Maj. Richard W. Johnson, surgeon, United States Army.

These officers will report to their respective district commanders for duty.

The functions of administration will devolve largely upon the chief surgeons of districts, who will, at all times, keep themselves in close touch with the office of the chief surgeon of the department. They will constitute the channel of communication between him and the regimental surgeons, in all matters, except when emergency imperatively requires a departure from this rule. All reports and papers of a routine character required of the regimental surgeons must be rendered with promptitude, and to this end telegraphic communication should be utilized freely. This applies particularly to the weekly sick report, forwarded by wire to the chief surgeon of the department, for the information of the commanding general.

It is expected that the chief surgeons of districts will lose no time in putting the machinery of their offices in smooth running order in every detail comprehended in Regulations, the Manual for the medical department, and in Circular No. 13, Headquarters Department of the Pacific and Eighth Army Corps, February 22, 1900. Their good judgment, energy, and efficiency should insure order in administration an promote the well-being and health of the command, and, to this end, periodic inspections of the personnel and equipment of the medical department, and of th sanitation of the camps, constitute an important part of their duties.

By command of Major-General Bates:

ARTHUR L. WAGNER,
Assistant Adjutant-General.

Where fidelity to duty has been so universal among the surgeons and personnel the hospital corps, both on the march and in the camp, whether caring for th sick under the enemy's fire, or in the safer precincts of the hospital out of rifle rang it would seem almost invidious to single out one, more than another, for special con mendation. Of Maj. H. S. T. Harris, however, it is but just to make favorabl mention for his energy in the trying position he held while chief surgeon of Schwan' expeditionary brigade.

In Major Harris's report, which is herewith appended, attention is respectfull invited to his remarks relative to the gallant conduct of Lieut. E. D. Sinks, assistan surgeon, Thirty-seventh Infantry, while dressing the wounded under fire.

The reports of Maj. W. P. Kendall, brigade surgeon, United States Volunteers, o the Bacoor Hospital; that of Maj. J. D. Glennan, surgeon, Thirty-eighth Infantr on the Batangas Hospital; that of Maj. F. A. Winter, on the regimental hospital the Thirty-seventh Infantry at Santa Cruz, and that of Maj. George H. Penrose, o the base hospital at Calamba, are also appended and speak for themselves.

Since the campaign by Schwan's and Wheaton's expeditionary brigades came to close, there has been a gradual reduction in the number of troops that formerly com posed the first division, in consequence of the demands that have been made upo it for service in the southern islands. At the present time the aggregate strength o the forces in the Department of Southern Luzon does not exceed more, perhaps, tha 16,000 men.

REPORT OF FIELD HOSPITAL, SANTA CRUZ, LUZON, BY MAJ. F. A. WINTERS, SURGEON THIRTY-SEVENTH INFANTRY, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON DEPARTMENT OF SOUTHERN LUZON, DATED MAY 14, 1900.

This hospital may be considered a product of Schwan's expedition into Laguna Province, which had its ending at Santa Cruz on January 23, 1900, so far as concerns operations of consequence.

It was established under the direction of Maj. H. S. T. Harris, brigade surgeon, as a field hospital, and has been in active operation as a 60-bed hospital since February 10, 1900. I took charge on February 17. I at once secured the building formerly the city hall of Santa Cruz, as it was well adapted to the purposes of a hospital, though in need of repairs, having suffered like other public buildings during the insurrectionary period. It is a large, airy, cool building, and the front room, accommodating about thirty patients, makes an ideal ward for acute cases. Adjoining this is a small room with eight beds for officers and surgical cases, with an alcove well adapted for use as an operating room. Two smaller wards for officers and a large squad room complete the room features, while a large hall, extending almost the entire length of the building, answers as a dining room. The kitchen is roomy, supplied with a large army range, and has convenient storerooms. A back porch is a convenient adjunct to the kitchen and very suitable for the installation of the Waterhouse-Forbes sterilizer.

Sick men have been received at this hospital from most of the regiments operating on the south lines—the Fourth and Eleventh Cavalry, and the Twenty-ninth, Thirtieth, Thirty-seventh, Thirty-ninth, and Forty-second Infantry. An excellent equipment was speedily obtained. Drugs have been abundant and generally of good quality. The commissary and the surrounding country have provided articles for special diet. Vegetables and all kinds of produce have been abundant, and the allowance of 40 cents a day, with a good hospital fund, has made it possible to feed the sick properly. The most signal need has been ice. I am now procuring it in small quantities from Manila through the post exchange. Malted milk and evaporated cream are the most generally employed articles of special diet. Fresh milk is not obtainable. I have never had a complaint from patients concerning the dietary, and I think they live as well as at any hospital in the United States.

The hospital corps as a rule cooperated with and assisted me in my efforts to maintain a scrupulously clean and orderly hospital. The force of men, with the aid of several Chinese laborers, has generally been adequate, and some of the enlisted force have shown marked ability and proficiency as nurses, etc. The men are required to

FIELD HOSPITAL AT SANTA CRUZ, LUZON.

attend reveille roll call. No man has been tried by general court-martial, though here have been a number of cases of summary court trials. The number of hospital corps men has averaged 18, generally sufficient.

The earth-closet system is used and the receptacles are emptied into the river below he town after thorough disinfection of the contents. It is a fact that but one case of yphoid fever developed in Santa Cruz, and even in this case it is probable that the infection came from an outside source.

There have been treated in this hospital 518 patients. Of these 23 were surgical and 495 medical cases. All indications for surgical intervention have been met and the results have been uniformly good. This hospital, in addition to serving as a base hospital for the troops in this vicinity, has also been a central point for supplies to Paete, Pagsajan, Magdalena, Majayjay, and Lucban; large quantities of drugs have been sent to these points at different times.

In conclusion, I desire to express my thanks to you for your helpful cooperation in the effort to make this hospital a creditable one and a suitable place for the acutely ill in this section of the department.

REPORT OF MAJ. GEORGE H. PENROSE, SURGEON, UNITED STATES VOLUNTEERS, ON THE BASE HOSPITAL AT CALAMBA, DEPARTMENT OF SOUTHERN LUZON, DATED MAY 8,1900.

This hospital was opened February 5, 1900, on which date I arrived in Calamba with 2 acting hospital stewards and 15 privates of the hospital corps, finding Acting Assistant Surgeon Macbeth awaiting me. In this town of 10,000 inhabitants there was one large convent that had been used by the Spaniards as barracks. This building, by tearing down and putting up partitions and completely renovating with scrubbing brush and whitewash, was made into two large wards holding 25 patients each, besides a room at the east end to accommodate the hospital corps. The front of the building was partitioned off into a dispensary and operating rooms, with a good-sized dining room and kitchen at the rear. A second house 200 yards away was made into quarters for female nurses, surgeons, and sick officers.

I brought with me from the medical purveying depot in Manila everything that was necessary to establish a base hospital. The hospital throughout is equipped with white enamel beds, woven-wire mattresses, and a perfect equipment for the operating room. In fact, everything necessary to properly open and maintain such a hospital as this was intended to be was provided. The total capacity is now 105 beds, but arrangements are being made to increase this number.

Wounded are at once brought to this hospital from all outlying stations in ambulances or by boat, as the hospital is only a short distance from the shore of the Laguna de Bay. Sick are transferred by the same method, and from this hospital they are sent to one of the reserve hospitals in Manila if their condition becomes chronic. On March 17, 7 contract female nurses reported to me and on the 21st 2 more, making 9 in all. Each ward has one or two trained nurses who with the hospital corps men attend to the sick. The trained nurses have direct charge, the men acting as assistants. One trained nurse has charge of all special diets, personally seeing to their preparation and serving; another has charge of the operating room. The discipline of the men at this hospital has been excellent. Their willingness and intelligence is deserving of the highest commendation. The attention to duty and the educated skill of the female nurses since joining this station has been everything that could be desired; the help that they have given to the seriously sick and wounded has demonstrated what a boon they are to the army. The 40 cents a day allowed by General Orders 182, Adjutant-General's Office, provides every delicacy, including chicken, fresh eggs, fruit, and lemons, everything that the sick may have. It is sufficient for ordinary demands.

For the most part, all troops are now quartered in native houses or shacks. The drinking water throughout the island is universally contaminated, and should never be used without boiling. While much has been done to procure boiled water for drinking purposes, I am of the opinion that the company officers do not pay enough personal attention to this essential point. Some surgeons have been negligent in informing commanding officers concerning the contamination of streams, or the commanding officers have not acted upon the advice. The result has been sharp, but short, outbreaks of bowel trouble, even to typhoid fever. In every instance, however, the trouble has been promptly met and the disease eradicated to a very large degree. The incessant scouting made necessary by this guerrilla warfare, much of which has to be made at night, is conducive to sickness. During these marches the men will drink of any and all water that they come across, and bowel trouble is the result. This may well be called the unavoidable sickness, but the fact of allowing men in the more permanent stations to drink impure water is to be deplored. Constant attention to the hygienic conditions of camps, the introduction of the Waterhouse-Forbes sterilizer, and the general use of the dry-earth closets are fast reducing the sick list to a minimum.

Report of Maj. W. P. Kendall, Surgeon, United States Volunteers, on the Brigade Hospital at Bacoor, to the Chief Surgeon, Department of Southern Luzon, dated May 5, 1900.

This point was selected as the site for the base hospital for the troops operating in Cavite Province, and was opened on or about July 22, 1899, by Maj. George H. Penrose, brigade surgeon, Second Brigade, First Division, Eighth Army Corps. It is situated directly upon the shores of Manila Bay, distant 3 miles from Cavite Nueva by water, and about 12 miles from Manila by water and 14 by land. It is connected with Manila by boats, which run three times daily, while a good turnpike connects it with the same point by land. It is the shipping point for all stores and supplies for the interior of Cavite Province, with which it is connected by roads, good in the dry season. Being upon the shore, the ground slopes toward the bay and is well drained. The hospital is situated in the wing of the church of the town of Bacoor, and though this church had been practically destroyed by the ravages of time and the artillery fire of successive, though not always successful, campaigns, it has been made habitable by the restoration of the roof, part of which is of nipa, the rest of corrugated galvanized iron. The numerous openings in the walls, due some to absent window frames, others to effective gun fire, serve for ventilation. The worst of these have been repaired and the protection furnished is all that can be desired.

The hospital consists of one ward in the building mentioned and two tent wards. The building accommodates 40 patients, the tent wards 85; the latter can be considerably expanded in case of necessity. These tent wards are all floored and framed, the floors 18 inches from the ground and connected with the hospital proper by board walks, thus securing communication with the hospital in the most inclement weather. The Hospital Corps is housed in tents, which, like the wards, are framed and floored. As these tents are in perfect condition and are all supplied with a fly raised from the tent proper 4 inches at the ridge and about 12 or 15 inches at the eaves, which method gives a good air space, they are very comfortable even in the hot weather, and are preferred by the men to the building.

The building furnishes, besides the ward, rooms for medical supplies and stores, a dining room for the patients, kitchen, operating room, and rooms for the medical officers. The wards are supplied with either field cots or cots having woven-wire mattresses, which serve their purpose well while in repair; they are, however, easily broken. Mattresses are, as a rule, not used, the patients finding it cooler without them. The patients are generally supplied with pajamas, which they wear day and night, seldom requiring other covering, so that both blanket and sheet, though furnished, are seldom used.

Food supplies are received from both the Commissary Department and the surrounding country, fresh beef of excellent quality being furnished seven or eight times in ten days. As there is no milk in the country, this is furnished in the form either of evaporated cream or Australian milk; both give satisfaction, but the latter is preferred. Eggs are generally obtainable. Fresh fruit, bananas, and mangoes abound in their season. They are, however, especially the mangoes, not cheap. Watermelons of a poor quality also abound; cantaloupes are poor.

Water is supplied in three ways—by wells, seldom used except in case of necessity; by two large cisterns, together having a capacity of 16,200 gallons, and by distilled water, brought daily by the Quartermaster's Department from Manila. The two latter are of excellent quality and the supply ample. Ice is purchased at a cost of 1 cent per pound, and the supply is ample.

The 40 cents per capita per diem allowed for the subsistence of the patients has been found sufficient in all except the rainy season, when prices, especially of eggs and chickens, are greatly advanced.

Bathing facilities are furnished both by the bay—distant 100 yards—to those able to avail themselves of it, and by the tub and sponge baths for those less able.

The latrines are of the dry-earth variety, emptied daily into the bay. They are cared for by native labor. Waste from the kitchen is similarly disposed of.

The laundering for the hospital is done by native labor at a cost of 1 cent per piece, gold.

The operating room is supplied with every convenience necessary to good work, and though slight improvements might be suggested they are more in the nature of reenforcements than actual necessities, as the quality of work done goes to prove.

arge operations, such as amputations of the thigh, for the radical cure of hernia, or appendicitis, etc., have been done with uniformly good success. Many natives apply for assistance, although at first they were unwilling to submit to operative procedures. That they are learning to trust the "Americanos" is an undoubted fact.

The cooking is done by members of the Hospital Corps, and is perfectly satisfactory. When supplies approved shall have arrived, the dining room will be well equipped with all that is requisite.

So far no female nurses have been asked for, as the accommodation for them is not good. The nursing has been done by members of the Hospital Corps. It is hardly o be expected that this service could be equal to that of the professional, yet nothing but words of praise can be spoken for what has been done.

An ambulance service is maintained between the hospital and all interior points, with which the hospital is connected by wire, and ambulances are stationed at the principal places, leaving nothing to be desired under present conditions.

This morning's report showed 21 hospital corps men present for duty, together with 1 hospital steward and 2 acting hospital stewards, sufficient for the needs of the hospital, though, when it is considered that this is also a supply depot, not too many.

At present there are but 2 surgeons at this hospital. It is due the acting assistant surgeons who have been connected with this hospital that they be mentioned in terms of highest praise. They have all done their work well.

The total number of cases treated in the hospital since it was opened is 1,706, with 18 deaths.

REPORT OF MAJ. J. D. GLENNAN, SURGEON, THIRTY-EIGHTH INFANTRY, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED AT BATANGAS, MAY 12, 1900.

I have the honor to make the following report on the operations of the medical department of the Thirty-eighth Infantry, United States Volunteers:

The regiment arrived at Manila December 26, 1899, disembarked next day, and left Manila January 1, 1900, on the southern expedition through Bacoor, Imus, Perez, Dasmarinas, Silang, Tolisaye, Tanauan, and Lipa, arriving at Batangas January 16, 1900, where the headquarters of the regiment has since been stationed.

The regiment now garrisons four stations, Batangas, Lipa, San Jose, and Bauang, province of Batangas. During and shortly after the main expedition the regiment or parts of it had engagements and skirmishes at Tolisaye, Luta, Batangas, Taal, Gulibay, Talumpoc, Pao, Cuenca and other places. Small expeditions are constantly sent out from these stations covering the territory under the jurisdiction of the regimental commander.

Transportation, etc.—Eight Chino bearers were obtained at Bacoor for the hospital and an ambulance at Imus, but the ambulance and the small wagon train which came from Manila were abandoned at Dasmarinas, owing to the trails being impassable for wagons, and were not seen until after our arrival at Batangas. Carromatas and other carts were impressed at Tanauan and Lipa, and were used to carry sick, wounded, and supplies. The Chinos were used to carry litters and small boxes which had been prepared containing medicines, dressings, and materials for liquid foods, and were very useful as weight carriers, but are by no means as satisfactory as the Hospital Corps in moving sick and wounded. They also required constant watching to prevent their looting. In the present conditions and on short trips their services are no longer required. In the expeditions into the country about here not even carts can be taken. Ponies are used to carry men when necessary, but fortunately no serious case has occurred when wagon transportation was not available. The regular litters have been abandoned on these trips. They are too heavy to be carried all day over mountains. A much lighter litter can be improvised when necessary.

When it was decided that the Thirty-eighth Infantry should remain at Batangas, the other regiments comprising the expedition turned their sick and wounded over to the Thirty-eighth, but our wagon train arrived with supplies, a steamer came in with commissaries, and the hospital ship *Relief* took off a large number of the sick and wounded. The greatest assistance was rendered by the hospital ship in the way of supplies and removal of patients. At no time, either on the march or after arrival here, was there any want of necessary medical supplies or proper food for the sick.

Hospitals, diet, etc.—The present hospital at Batangas is in the municipal building, a large, cool, and pleasant building. Two other buildings across the street are also used, one as a detached ward for fever patients and one for quarters for the hospital corps men. Only the second stories are used as wards or quarters. There is also a small depot of medical supplies in the hospital. There are also hospitals in good buildings at the other posts of the regiment.

The sick are subsisted on the 40 cents per day fund. For liquid diets we have soups and condensed milks of different kinds, beef extracts, malted milk, evaporated cream, and recently Australian milk, which is proving very satisfactory. Eggs and chickens are very plentiful here. There has been some difficulty in obtaining fresh beef for the command.

Sanitation.—Water is boiled for drinking, and all waste matters from the command are removed from town and emptied into the river near the bay. The native method of disposal of waste on the surface of the ground is a constant menace to us, but our system of removal is being slowly extended to those living in the central part of the town.

Health, etc.—The health of the command is good and the number of sick and wounded has been surprisingly small, considering the kind of service. The sick report has been mainly from diarrhea, due to the saline water here; intermittent malarial fever, and sore feet from marching. This is a malarial region, and the country east of here is worse. There have been a few cases of dysentery, but not of the severer forms.

Two cases of smallpox occurred in the regiment, but the disease did not spread. These men have been repeatedly vaccinated, and at least one of them had been considered successful. I believe that much of the virus furnished in the United States is poor, and there is no certainty that the sore produced is a successful vaccination. I would recommend special care in the choice of lymph, and the hypodermatic method of vaccination. The regiment was revaccinated here with carabao virus from Manila, and many cases were successful which had before failed. Typhoid fever and smallpox are believed to prevail extensively among the natives here, due to the absence of all sanitary measures. We have been unable, so far, to vaccinate very many.

Three cases of typhoid fever occurred in the regiment, but the place of infection was discovered and no new case has occurred for a month.

The general condition and physique of the men have improved since enlistment. Young men have developed well; instances to the contrary are few, and the regiment is in good working condition.

The hospital stewards and hospital corps men on duty with the regiment have been equal to every emergency and have done much hard work, being on duty almost constantly. With increased experience their services have become more valuable, and the sick and wounded are intelligently, faithfully, and well cared for.

DEPARTMENT OF THE VISAYAS.

REPORT OF MAJ. L. W. CRAMPTON, SURGEON, UNITED STATES ARMY, CHIEF SURGEON DEPARTMENT OF THE VISAYAS, ILOILO, P. I., MAY 31, 1900.

I have the honor to submit the following report of the operations of the medical department for the period from January 1, 1900, to May 31, 1900. This department, originally the Visayan military district and First Separate Brigade, Eighth Army Corps, was organized into a department by General Orders, No. 1, Division of the Philippines, dated Manila, P. I., April 7, 1900, and is divided into four districts.

The first district embraces the islands of Samar and Leyte, the second the islands of Cebu and Bohol, the third the island of Negros, and the fourth the island of Panay. The headquarters of the department are at Iloilo. The department extends over a large extent of territory, and at the present time there are about 72 occupied stations, garrisoned by the following troops: Light Battery G, Sixth Artillery; the Sixth Infantry; headquarters and two battalions of the Eighteenth, and the Nineteenth Regiment of Infantry; the Twenty-sixth, Forty-third, and Forty-fourth regiments of Volunteer Infantry; the Negros organization of native scouts; and detachments of the Signal and Hospital Corps.

The number of medical officers and members of the Hospital Corps serving in the department at the present time is as follows: In the regular service, 1 major, 8 captains, and 2 first lieutenants. Four of the captains hold rank of major in the volunteer service.

In the Volunteers there are 1 major, 3 captains, and 3 first lieutenants. There are 41 acting assistant surgeons, 4 hospital stewards, United States Army; 9 hospital stewards, United States Volunteers; 20 acting hospital stewards, and 21 privates of the Hospital Corps. There are 8 female nurses on duty at the hospital in Iloilo.

At the present time there are twenty-five stations without medical officers, although not without medical attendance. It has been the aim to keep at least one private of the Hospital Corps with every detachment, however small, and an acting hospital steward whenever it was possible to do so. Occasionally a medical officer will have under his charge as many as four different stations, from 5 to 15 miles apart. In iting these substations not on the seacoast the officer has to travel on horseback, by such conveyance as he may find, over roads almost impassable in the rainy son, and in some instances dangerous at all times, rendering it necessary for him have an escort. Stations on the seacoast, while more easy of access, can not be ited with any regularity, for the reason that advantage must be taken of a passing amer or sailing vessel going in that direction. This, of course, is not an ideal rvice for troops in the field, but with the limited number of medical officers serv- g in the department it is the best that can be done, and the results have been far tter than might have been expected.

Care of the wounded on the field.—Prior to the issuing of General Orders, No. 10, epartment of the Pacific, dated February 10, 1900, which prohibited the practice, ninese laborers were largely used as litter bearers, one member of the Hospital Corps ith two Chinamen constituting a litter squad. These, with such medical officers id acting stewards as might accompany the expedition, would operate on the firing ne, administering first aid and removing the wounded to some convenient dressing ation in the rear, from whence they could be transported by ambulance, bull cart, such transportation as the country afforded, to the nearest permanent station. There not much opportunity for varying the ordinary rules in caring for the wounded in ngagements against an enemy such as we have. The transportation, as a rule, is very mited, and reliance must be placed almost entirely on the contents of the hospital orps pouches and the first-aid packets for the initial dressings, and as the number of ounded is usually small in comparison with the number engaged, these answer very purpose.

The first-aid packet, while a most valuable adjunct to a soldier's outfit, is by no eans perfect in every particular. The great trouble in a tropical country, where he soldier is wet almost constantly from rain or perspiration, is to find a suitable nd safe place to carry it where it will not only cease to be an incumbrance, but will ot go to pieces from the moisture or become infected. The first-aid packet in its resent shape can not be easily disposed of on the person of the soldier without giv- ng him annoyance, especially when he lies down at night with his clothes on after hard day's work. This could be remedied to some extent by changing its shape, ut this would not prevent the tendency to destruction or the liability to infec- ion. In my opinion the one place to carry the first-aid packet where it will be lways at hand, safe from infection, and never an incumbrance, is the butt of the ifle, in a chamber made specially for the purpose, the same as is now provided for he ramrod. In place of the present shape the packet could be made into a cylin- ler, sealed up in tin or lead foil, and could be easily disposed of. The weight of the acket would nearly equal the weight of wood removed, if that should be urged as n objection, or the loss could be easily made up by increasing the weight of butt late. The packet and the ramrod could be carried in the same compartment, but t is believed that it would be better to have a separate one for each.

Hospitals.—There have been no hospitals erected in this department, the buildings used for hospital purposes being either old government buildings, convents, or private dwellings. The hospital in Iloilo, the largest one in the department, occupies four private residences adjoining each other, in the central portion of the town, with a supplementary ward for venereal cases and convalescents in the palace.

These buildings are old and badly out of repair—the chronic condition of all Spanish buildings in this country—and would never have been used for hospital purposes if there had been any choice in the matter. The surroundings are unattractive, but paint and a plentiful use of soap and water have made a wonderful change in the interior. The building known as the palace is in very bad condition and is not susceptible of much improvement, and not much effort is expended on it except to keep it clean. The Iloilo hospital, under the charge of Maj. Herbert W. Cardwell, surgeon, United States Volunteers, is the largest one in the department, having a capacity of about 250 beds. Patients are received into this hospital from all stations in the fourth district, as well as from stations in the third district. The general policy has been to have a small hospital at all of the more important stations for the treatment of ordinary cases. Patients with typhoid fever and chronic bowel troubles requiring a special diet are usually sent to the Iloilo hospital. A hospital of 72 beds has been established at Cebu, in charge of Maj. H. C. Fisher, surgeon, United States Volunteers, the building being a part of an old convent and capable of considerable expansion. There is a small but well-equipped hospital at Bacolod, under charge of Capt. Paul Shillock, assistant surgeon, United States Army, with accommodations for about 40 patients. Another hospital of about the same capacity is located at Capiz, under the charge of First Lieut. E. A. Dean, assistant surgeon, United States Army. These hospitals are all well equipped and have ample accommodations for the care of all the sick in the department.

Barracks.—The buildings used for barracks are of the same general class as those used for hospitals, and are well adapted for the purpose in this climate. The subject of ventilation, air space, and overcrowding does not cut as much of a figure in the Tropics as in temperate climates, for the reason that the houses can be so thoroughly opened on all sides, thus giving free access to the wind, which fortunately blows almost continually.

Subsistence of the sick.—Until discontinued by General Orders, No. 11, Department of the Pacific, February 6, 1900, all the sick in this department except those treated in the hospital at Iloilo, where the 40 cents per day, as authorized by General Orders, No. 182, Adjutant-General's Office, 1899, was allowed, were subsisted on the 30 cents per day, Mexican, from the public civil fund. This was a very satisfactory way of feeding the sick, but unfortunately it was impossible, after repeated efforts, to induce medical officers, many of them new to the service, to comply with department orders regarding the expenditure, and for this reason it was disallowed. At the present time the sick at all hospitals where rations are utilized are subsisted as provided for in General Orders, No. 182. With the subsistence department and the produce of the country to draw from, medical officers have at their command a wide range of articles of special diet, and it is not believed that the sick of any army in the field are better cared for than our soldiers in the Philippines, where they have all the necessaries of life and many of the luxuries.

While the efficiency and the discipline of the Hospital Corps are open to criticism, it is perhaps better than ought to be expected under the circumstances. A hospital corps in time of war is a very different organization from the same corps under conditions of peace. Many of the men enlisted from civil life, without any military training whatever; they are transferred after serving less than a year in the line, and from the very nature of the service it is simply impossible to give them the proper instruction in their duties. Besides, many of the medical officers are new to the service, and while good men from a professional standpoint, they have not had the necessary training themselves to make them good instructors or disciplinarians. Yet there are enough good men to perform the duty of nursing efficiently, and I have never heard of one who failed in his duty in any way under fire.

Capt. T. S. Bratton, assistant surgeon, United States Army, regimental surgeon of the Nineteenth Infantry, has reported the case of a private of the Hospital Corps on duty in Cebu, which shows what a hospital corps man is capable of doing in an emergency. While Captain Bratton was absent from his station a native woman was badly cut with a bolo, one cut extending from the outer angle of the eye to the ear, allowing, it is said, the eyeball to drop out. She also had several bad cuts in the arm. Private Samuel Jones replaced the eyeball and sewed up the cuts, another private—Henry Becker, Hospital Corps—having administered the anæsthetic. The wounds in the arm were so severe that he advised amputation, possibly on account of the loss of the blood supply. This was refused. In a day or two the arm became grangrenous, and Private Jones again advised amputation, to which the woman consented. Private Becker administered the anæsthetic and Private Jones made a circular amputation above the elbow. At the time of Captain Bratton's report the stump was healed and the wound in the face nearly so. The efficiency of the Hospital Corps may be represented by a sliding scale, from Private Jones to the man who knows nothing, the preponderance being at Private Jones's end of the scale.

Sanitary condition of the command.—The health of the troops serving in this department has been uniformly good. Apart from the climate, the principal source of danger to our troops is the drinking water, and it is due to the rigorous enforcement of the order by medical and company officers, that all drinking water must be boiled, that typhoid fever, which, with dysentery, is the disease most to be feared by our troops, has not prevailed to a greater extent.

The total number of cases of typhoid fever treated in the hospital at Iloilo since November 1, 1899, the time the disease became prevalent—before that time there being but a few sporadic cases—is 54. During the same period there have been 6 cases at Capiz. At the present time there are 8 cases in the hospital at Iloilo and 1 at Capiz, all of whom are convalescing. This represents rather a small percentage when it is remembered that typhoid fever is endemic in these islands. The idea has become prevalent that typhoid fever was brought here by the Twenty-Sixth Infantry. This is both true and misleading. The Twenty-Sixty Infantry did arrive here with typhoid, but the disease was prevalent here among the natives long before. and has appeared in other regiments in other parts of the island. It is the common experience of medical officers that cases generally develop after a command has returned from a campaign in the field, when men will drink any kind of water.

Manson, in his work on tropical diseases, says: "It would also appear that soldiers on the march contract the disease in passing through an uninhabited country, in spite of the fact that the camp may be pitched in spots which presumably have never been occupied by man before, and although the men may have drunk only of water from springs and streams that were beyond suspicion of fæcal contamination. Similar testimony comes from Australia, where typhoid has occurred in the back country hundreds of miles from fixed human habitation."

While typhoid fever may be controlled to a great extent by proper sanitary measures, it will never be entirely eliminated from any large body of troops on active field duty in a tropical country.

Smallpox prevails to an alarming extent in these islands, to the great terror of all newcomers, who in a short while pay no attention to it, and although our troops occupy towns and sleep in houses with impunity, the disease has not prevailed among them to any extent, the total number of cases so far being 20, with 5 deaths. This immunity is due of course to the repeated vaccinations to which the men have been subjected.

A vaccine farm has been established in Iloilo and has been in operation since April 1, from which virus is supplied to all parts of the islands, both for the vaccination of the troops and the natives. Instructions have been given to the chief surgeons of districts to use their utmost endeavors by cooperation with the native doctors to organize a system for the thorough vaccination of the natives. This has been done by our medical officers wherever virus could be sent them, and in some places, as in Iloilo, it has been made compulsory. This practice for the time can only be inaugurated in places now held by our troops. Reports have been received from several medical officers showing a marked decrease in the number of cases of smallpox among the natives. With a condition of peace throughout the islands and by the establishment of more vaccine farms, smallpox can in time be made to disappear, or at least cease to be an important factor in contributing to the sick list. It has been found that the virus obtained from the farm in Iloilo is much more effective than that obtained from Manila, for the reason that it is fresher, it being practicable to deliver it in most cases on ice.

When ice machines are placed at more points throughout the department, the question of vaccination of the natives will be very much simplified. The ice machine in Iloilo is the only one that has been in operation for any length of time. Another one has been placed at Cebu, and has been in operation since May 15.

The great source of danger to troops in the Tropics is the drinking water, and the men have learned to realize this, so that they readily take to the idea of drinking boiled water. Of course some men will drink anything, and when on the march drink what the country affords. In some places good springs can be found, but in the dry season water is obtained from shallow wells and small streams, both dangerous for drinking unless boiled. In the rainy season an abundant supply of rain water is collected in overground tanks. In Iloilo distilled water is furnished, but as the delivery of it is rather crude, being hauled in open tanks, some organizations, to avoid a possible contamination, take the further precaution of boiling it. A distilling plant has recently been put in at Cebu. The Waterhouse-Forbes water sterilizer should be furnished to all permanent stations. A few of them have been sent to the department and they operate in a most satisfactory manner.

Generally the health of the troops has been good, a great deal of the ineffectiveness being due to minor troubles, such as the dhobie itch and the small tropical ulcers, which are very annoying and difficult to heal. Dengue is also an important factor in building up a sick report. While typhoid fever stands in the front rank of the diseases to which our army is exposed, dysentery, with its concomitant liver abscess, is much more prevalent and claims many more victims. It is a common expression here that when a man gets dysentery his usefulness is about ended, especially if it becomes chronic, for these cases do not tend to recovery in this climate, and the sooner they are sent away the better.

Both beriberi and leprosy are quite prevalent in some of the islands, and although no attempt is made at segregation no case of either of the diseases has been reported among the troops in this department, and no case of bubonic plague has appeared among either troops or natives.

Report on the brigade hospital at Iloilo, Panay, made to the chief surgeon Department of the Visayas, June 1, 1900, by Maj. Herbert W. Cardwell, surgeon, United States Volunteers.

In compliance with your instructions to present a report of administration at this hospital for the period beginning June 1, 1899, and ending this date, I have the honor to report that I arrived at this station on September 25, 1899, and was assigned to duty in charge of the brigade hospital. This hospital had been organized by Maj. E. R. Morris immediately after the occupation of Iloilo by the American forces in

February, 1899, using for the purpose a private residence, which was one of the few buildings not destroyed by fire when the insurgents left the town. Some time afterwards an adjoining residence was also secured, as the number of patients increased, and on my arrival I found these two buildings in a fair state of repair, fairly well fitted with beds or cots, and sufficiently supplied with medical and surgical supplies for the care of the 50 to 60 patients that composed the normal number of inmates at that time. In October, 1899, when preparations were in progress for an advance upon the enemy, it was seen that hospital accommodations must be promptly and materially increased. Necessary supplies were readily obtained from Manila, and the second floor of a building adjoining those already in use was secured. These three buildings gave bed accommodations for about 190 patients, with sufficient room for dispensary, operating room, and executive offices.

After November 21, 1899, the troops formerly stationed at Iloilo, Jaro, and Molo were in the field, with the exception of a provost guard for the city, and there was in consequence no proper place for men who would ordinarily have been "sick in quarters." A further addition was then made to the capacity of the hospital by utilizing the upper floor of the "casa gobierno," or palace, at the farther end of the town, for a convalescent or supplementary ward. This building is still in use for the care of venereal cases and a few convalescents requiring only a minimum of attention.

The buildings are not suited for hospital purposes to this extent: More attendants are required for efficient work than would be required in a building arranged for the purpose. No building in this city or its neighborhood is suitable without the expenditure of a large sum for immediate repairs and alterations. The best of the buildings available is practically placed out of consideration, being situated in Jaro, distant from all of the ordinary water routes of transportation.

New buildings now in the course of construction in the city can, it is believed, be secured within the next two months at no greater cost to the Government than those now in use. If these are obtained the hospital will be very well housed.

No trouble has been experienced in securing from Manila all the medical and surgical supplies and appliances required for use, and improvements have been made steadily in substituting iron bedsteads for wood and canvas, and in providing better furniture for the operating and other rooms.

The hospital at present lacks many of the niceties of the magnificent institutions in great centers, but patients receive as good care here as in any civil hospital in which I have worked, and, in addition, with the aid of the allowance for commutation of rations, are much better and more suitably fed. There have been times when temporary deficiencies of the subsistence or quartermaster's departments have tried the souls of those in charge, but as a rule all wants have been promptly and properly met.

The administration of the hospital has not differed from that of any other institution of its kind. The entering patient is met by the clerk in charge of the register, who verifies the patient's name and record. He is then examined by the surgeon detailed for that purpose, Acting Assist. Surg. G. H. Calkins, to avoid possible mistakes in assignment to wards and to prevent the introduction of smallpox into the general wards. Check records furnished by the nurses and verified by the surgeons in each ward are used to trace and check the record of the patient, change in diagnosis or operations of note being recorded daily and immediately transcribed in the register. Clothing collected on admission is checked on a printed list in duplicate, verified by the patient, and one copy delivered to him, while the other copy is recorded and locked with the clothing in a numbered locker. Ordnance property is properly labeled and delivered to the ordnance officer of the department at his storeroom. Valuables are recorded, placed in individual boxes, and deposited in the office safe, which is itself within a vault.

The patient is sent to the ward with a duplicate diagnosis slip, one end of which is signed and filled in by the surgeon at his first visit, and the other end, attached to the ward chart, is signed and filled in on the return of the patient to duty. Comparison of these records prevents mistakes in the permanent record.

On return of the patient to duty two notices are sent out, one to the surgeon of the organization to which he belongs, and one to the commanding officer. If the organization is in Iloilo, the patient is sent direct to report to his commanding officer. If he requires transportation to his command, he is sent, with a printed notice of identification, to the adjutant-general for assignment to quarters and rations till transportation is available.

The medical staff of the hospital has shown little change, Acting Asst. Surgs. G. H. Calkins, R. M. Kirby-Smith, and Henry du R. Phelan having been on duty during the greater part of the period named. Each of these has from time to time done duty in the field in emergency, when expeditions were about to start and no other medical officer was available. Their services have been in every respect above criticism. Dr. Phelan has but lately been relieved by First Lieut. E. W. Pinkham, assistant surgeon, United States Army.

In October, 1899, the Twenty-sixth Infantry, United States Volunteers, arrived at his station, and soon afterwards a case of typhoid fever was admitted from that regiment. This subject has been reported on in full before, but it is proper to say that he rapid scattering of this regiment (infected in the United States) through this island, and the quartering in towns, which in many cases they occupied only temporarily, with the rapid successive admission of case after case of typhoid from its ranks, gave rise to the gravest fear of a serious epidemic. Neither time, effort, nor money was spared to stamp it out, and although about 60 cases were treated in this hospital, no case has been admitted for over six weeks until within the last month, when 3 sporadic cases have been received. The total number of cases on hand now is 7 convalescent and 3 acute cases.

Smallpox is epidemic in the island, and since December, 1899, from 1 to 5 cases among soldiers have been in hospital, in tents set aside for that purpose and isolated. The Quartermaster's Department is now building a nipa smallpox hospital in the same inclosure of Government land with the vaccine farm (lately established here), and in an isolated spot. No cases of smallpox are now on hand, but it is feared that some will accrue with the new stations lately established.

Other diseases which have been treated here are of the same character as those encountered in other parts of the archipelago. Amœbic dysentery improves under quiet and strict dietary, only to relapse on return to duty and the ration. It is evident that return to a higher latitude is the only salvation of this class of cases. It is even doubtful whether a return to and a considerable sojourn in the United States would suffice, unless the case is sent early in its course. I have seen a soldier who was sent to the United States in the fall of 1898 and returned to duty here in 1900 immediately reenter the hospital with severe dysentery. This soldier had an excellent record, and there was no evidence whatever of any desire to shirk duty. Soldiers sent from here to Manila with a view to transfer to the United States frequently improve during the short trip to Manila and seem fit for duty, but almost without exception they have again to enter the hospital very shortly after their return here. Abscess of the liver as a result of dysentery has been seen in a number of cases, but in 2 cases of large mutiple abscesses of the liver no history of either dysentery or the liquor habit was obtainable.

In my opinion no case of true malaria has been treated in this hospital since my arrival. I am willing to admit that a diagnosis of "malarial fever" is a sign of weakness—an admission that no diagnosis has been made.

Bacteriological apparatus has but lately been received, and it is hoped to eliminate the word malaria from the sick report of the hospital.

REPORT ON THE POST HOSPITAL AT BACOLOD, NEGROS, MADE TO THE CHIEF SURGEON, DEPARTMENT OF THE VISAYAS, MAY 26, 1900, BY CAPT. PAUL SHILLOCK, ASSISTANT SURGEON, UNITED STATES ARMY.

The hospital at Bacolod, Negros, is situated in three buildings formerly used as dwellings, and for which a rental of $110 (Mexican) per month is paid by the Government. The buildings are ample for a hospital of this size, allowing 45 patients to be taken care of. They are in a fair condition of repair except the roofs, which leak. I have repeatedly called the attention of the proper authorities to the bad condition of the roofs, but owing to the owner refusing to make any repairs involving expense unless her rental be increased, the roofs have not been repaired. Under the directions of the district commander I have inspected buildings at Silay, offered for hospital purposes, but found them totally inadequate and unfit for such purposes. No other buildings in Bacolod large enough and appropriate for a hospital can be found except at an exorbitant rent. One building, the property of Señor Gonzaga, is large enough and in excellent condition for a hospital, but he asks $250 per month rent for it. A smaller building at Silay, the property of Señor De La Rama, is offered at $300 per month. Buildings for any purpose in Bacolod are very hard to procure and only at exorbitant rates, due to the influx of hacienda owners from the neighboring country into Bacolod to escape the disturbed condition of affairs in the country. The hospital has had such minor repairs as involved no expense, made to it by me, from time to time as necessary, and has at all times been kept scrupulously clean.

Bacolod until recently supplied all subposts on the island of Negros with their medical supplies. At present most of these subposts make direct requisitions on Iloilo. In an emergency subposts are still supplied from here.

Members of the Hospital Corps are sent from here to the subposts as required. A very large part of the time of medical officers and hospital corps men is taken up outside of their military duties in looking after the general sanitation of the pueblos.

Report on the Post Hospital at Cebu, Island of Cebu, made to the Chief Surgeon, Department of the Visayas, May 1, 1900, by Maj. Henry C. Fisher Surgeon, United States Volunteers.

The hospital building is situated upon the Plaza de Legaspi, opposite the Cuarte del Infanteria. It is an old building, formerly occupied by the Recolleto monks as a "convent." Only a portion of the second story is used as a hospital, the chapel being used for its original purpose and the lower floor as quartermaster's and private storerooms. The building is old and in a poor state of repair, with leaky roofs. However, it answers the purpose as a temporary hospital fairly well, and the patients are comfortably cared for.

Hospital accommodation is provided here for the garrison of the post and for the severer type of cases from the smaller stations of this and adjacent islands. This hospital has also been serving as a subsupply depot for these places. At present there are 72 beds, but more have been asked for, so that 100 patients may be accommodated.

As a rule there have been sufficient supplies furnished, a notable exception being a deficiency in the supply of quinine last February and March, when there was a great increase in the prevalence of malarial fever.

Fresh milk is not obtainable, but malted milk and the various canned milks have proved very fair substitutes. It is hoped that soon the Australian canned milk may be obtained, as I have been asking for it since last January. Fresh eggs and other foods can be procured, and the hospital is able to set an excellent table upon the 40-cents allowed by the commissary.

The water supply is from shallow wells, and is boiled before being used. It is expected that soon the distilling apparatus now being erected will supply the hospital and the garrison with excellent water. An ice plant for the hospital is in course of erection.

The principal diseases have been malarial fevers, diseases of the skin, venereal diseases, dysentery, and diarrheal disorders. There have been few cases of typhoid fever.

At present I have as an assistant Acting Asst. Surg. J. F. Jones, United States Army. There are 1 hospital steward, 1 acting hospital steward, and 23 privates on duty with the hospital. Of this number there are usually several sick, and details have to be made for detached service.

Report on the Post Hospital at Capiz, Panay, made by Lieut. Irving W. Rand. Assistant Surgeon, United States Army, to the Chief Surgeon, Department of the Visayas, May 5, 1900.

Shortly after the entrance of the troops into this town the quartermaster provided for hospital use a building which is fairly well suited to its purpose—as much so as any in the place.

It faces the river, which is but a few feet distant. It is a two-story building, somewhat out of repair, but with no serious defect. The lower story is used for storerooms and the dispensary. It also has two rooms, dark, damp, and unsuited for use except as lumber rooms or workrooms for natives. In one of these two rooms wounded native prisoners are now confined. Attached to the lower story is the stable, in which are situated the earth closets for the corps and convalescents.

The upper story consists of two airy rooms, 27 by 20 feet, with narrow balcony overlooking the street. These are used as wards. Other smaller rooms are used as squad rooms, operating room, storeroom for patients' effects, lavatories, kitchen, pantries, etc.

A third of the house is guttered, converging to a small tank, 4 by 4 by 4 feet, in the courtyard. An additional tank has been requested. There is also in the yard a well, which has been cleaned, but its water has not been used. The water from a well at the convent has supplemented rain water when needed.

The working of the hospital has from time to time differed in relation to the force available for use there and also in relation to the supplies available.

When the campaign opened, at the commencement of dry weather, in November last, the transportation available for the medical department of each battalion was a portion of the battalion headquarters' bull cart, drawn by one bull. In these the indispensable medical and surgical supplies were taken, and the few forms and blanks required. Everything else was stored in the quartermaster's storehouse in Jaro. At the close of the operations around Pavia and Santa Barbara expeditionary movements of from two to three days' duration were made into the country from the steamer *Elcano* until Capiz was reached, where Companies A and B, of the First Battalion, disembarked December 15, 1899, and Companies C and D went on to Romblon. The supplies now on hand consisted merely of what remained of the small stock taken with us on the campaign. Those stored at Jaro did not reach us until February 1, 1900.

On arriving at Capiz there were 2 acting stewards (1 sick with typhoid fever) and 5 privates.

Within the next three weeks 3 companies were detached, with a hospital corps man each, leaving 2 men and 2 acting stewards (1 still sick with typhoid). At this juncture 2 men were detailed from the companies for service with the corps, and the work of the hospital went on. At the time the companies were detached the surgeon requested that another medical officer and 6 hospital corps men be sent for duty in the district. An officer and 4 men were received, but the officer and 2 of the men had to be sent to Dao, leaving at Capiz 4 hospital corps men and the 2 men detailed from the companies.

Somewhat later the 2 detailed men were transferred to the corps and later assigned to duty here. At the present time there are for duty here 2 acting stewards, 1 cook, 1 day nurse, and 1 night nurse. Of the rest of the corps 1 is sick, 1 in the guardhouse, and 1 with Company L, Tenth Infantry, on detached service. This condition leaves the hospital chronically short-handed.

The senior acting steward attends sick call, notes treatment and disposition of cases, prepares morning and other reports, and exercises a general care over the hospital. The junior acting steward fills the prescriptions, dispenses medicine, and cares for the native sick prisoners. The cook attends to his specific duties and does inside police. The day nurse cares for his patients and polices the wards and hall. The night nurse's duties are limited as a rule to his night work. The rears are cleaned by the prisoners, and when necessary water is hauled by them. Prisoners are also painting the interior of the building. The hospital washing is done by a native of Capiz, and is paid for on vouchers by the medical department. The expenditure for ice for the hospital has as yet not been authorized, although urgently needed.

Of the six cases of typhoid which have been treated at this point by the surgeon, two cases, those of Acting Steward W. C. Moulton and Private Francis W. Philipps (report of December, 1899, diagnosed as malarial fever continued, but in January, 1900, was clearly typhoid) were contracted on the steamer *Elcano*, or during the campaign in the interior; that of Private Connelly was contracted while in General Hughes's column, crossing the island, and that of Privates Reed, Hansen, and Barnes, from Dumarao, or its neighborhood, as all three were sent in from there. None originated in Capiz. These cases have been of medium severity, with fever not ranging above 104°. Private Hansen, while in the third week of the disease, developed gangrenous stomatitis, or noma, and died ten days afterwards.

THE DIVISION OF CUBA.

HEALTH OF THE TROOPS.

In Cuba during the year 1899 the sick and death rates were in marked contrast to those of the previous year. In 1898 the troops were exposed to all the dangers of active service, to excessive fatigues, under exposure to tropical heat and heavy rainfalls, to sleeping without shelter and in wet clothes in the most malarious localities, and to the infection of yellow fever. In 1899 they were comfortably housed in barrack buildings constructed specially for them, or in Spanish barracks, which had been carefully disinfected and repaired for use. These barracks were on high and well-drained grounds, and some distance from neighboring towns, as a protection from infectious diseases. Attention was given to sewage disposal and the general police of the camps, to the supply of a pure water for potable and kitchen purposes, to the issue of a suitable ration, the careful preparation of the dietary, and the selection of appropriate clothing. Under these conditions of garrison life it was to be expected that the mortality rate would be small compared with that of the previous year. There is no doubt, however, that if our troops in Cuba were to be called upon for active service they would again fall victims to the exposures incidental to such service in this island.

In Cuba during the year 1898, with a mean strength, volunteers and regulars, of 8,345, the admissions to sick report were equivalent to 3,413.54 per thousand men, and the death rate from all causes to 91.55 per thousand. Injuries contributed 265.43 to the rate of admission and 23.61 to the death rate, and gunshot injuries 163.68 and 21.69, respectively. Malarial infections constituted by far the largest proportion of the cases, 1,924.74 per thousand men, and contributed 14.02 to the death rate. But typhoid fever and yellow fever gave higher death rates: Six hundred and fifty-four cases of the former, with 154 deaths, gave 78.36 as the rate of admission and 18.45 as that of mortality; and 1,128 cases of the latter, with 139 deaths, gave the respective rates of 135.16 and 16.66. Diarrheal diseases contributed 335.05 to the rate of admission and 9.23 to the death rate. One case of smallpox, not fatal, was recorded.

In 1899, with a mean strength, regulars and volunteers, of 200.51 officers and men, the admission rate was 2,749.74, but the death rate was only 18.30 per thousand of strength. Injuries contributed 211.76 to the admission rate, but only 1.94 to the death rate, and gunshot injuries only 2.99 and 0.80 to these respective rates. Malarial fevers, as in the preceding year, contributed the largest proportion, 1,098.46, of the admission rate, but caused only 2.50 deaths per thousand men, as compared with 14.02. Seven hundred and ninety cases of typhoid fever, with 88 deaths, gave an admission rate of 39.40—only one-half of that of the preceding year—and a death rate of 4.39—only one-fourth of that of the preceding year—while 247 cases of yellow fever, with 48 deaths, gave the respective rates of 12.32 and 2.39 per thousand of strength, as compared with the much larger rates, 135.16 and 16.66, due to the exposures of the year 1898. Diarrheal diseases increased in recorded prevalence during this year to 434.35 per thousand of strength, but diminished in gravity, as shown by a reduction of the death rate from 9.23 to 1.45. One fatal case of smallpox was reported during the year.

SEASONAL PREVALENCE OF DISEASE.

In Cuba the mean monthly rate of admission to sick report from the army as a whole, regulars and volunteers, in 1899, was 211.41 per thousand of strength. During the early months of the year the rate was slightly below the mean; in May it dropped to a minimum of 116.24. In November and December it was also below the mean; but in July, August, September, and October it was above the mean, the maximum, 266.31, having occurred in August. Malarial fevers were chiefly responsible for the increased rates of these months.

The monthly death rate for the year was 1.36 per thousand of strength. It was above this from April to August, inclusive, the maximum having been 2.91 in July, due to 2.28 from yellow fever. The minimum was 0.54 in November. The following table illustrates the seasonal movement of certain diseases:

	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	78	2.02	8	0.21	137	3.14	14	0.32	144	3.60	21	0.52
Yellow fever	4	.10	1	.03	3	.07	.....	......	1	.02	.....	......
Malarial infections	3,801	98.65	8	.21	3,658	83.87	15	.34	3,816	95.29	6	.15
Undetermined fevers	60	1.56	.....	......	80	1.83	.....	......	168	4.20	.....	......
Rheumatic affections	220	5.71	.....	......	274	6.28	.....	......	243	6.07	.....	......
Consumption	21	.55	2	.05	14	.32	3	.07	11	.27	.....	......
All venereal diseases	382	9.91	.....	......	436	10.00	1	.02	404	10.09	.....	......
Alcoholism and direct results	30	.78	1	.03	44	1.01	1	.02	71	1.77	2	.05
Diarrheal diseases	1,066	27.66	3	.08	1,658	38.02	3	.07	1,354	33.81	7	.17
Pneumonia	25	.65	6	.16	23	.53	5	.11	5	.12	1	.02
Total respiratory	393	10.20	6	.16	422	9.68	6	.14	341	8.52	1	.02
All diseases	7,933	205.89	44	1.14	8,676	198.93	53	1.22	8,302	207.31	45	1.12

	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	153	7.26	14	0.66	75	5.45	10	0.73	46	3.56	4	0.31
Yellow fever	.....	......	.....	......	3	.22	.....	......	80	6.19	13	1.01
Malarial infections	1,787	84.81	5	.24	964	70.08	3	.22	1,075	83.22	2	.15
Undetermined fevers	41	1.95	.....	......	26	1.89	.....	......	19	1.47	.....	......
Rheumatic affections	108	5.13	.....	......	70	5.09	.....	......	71	5.49	.....	......
Consumption	5	.24	1	.05	8	.58	1	.07	2	.15	.....	......
All venereal diseases	225	10.68	.....	......	216	15.70	.....	......	191	14.79	.....	......
Alcoholism and direct results	55	2.61	.....	......	32	2.33	.....	......	34	2.63	.....	......
Diarrheal diseases	782	37.11	2	.10	736	53.50	8	.58	682	52.79	1	.08
Pneumonia	10	.47	3	.14	7	.51	3	.22	1	.08	.....	......
Total respiratory	169	8.02	3	.14	106	7.71	3	.22	46	3.56	.....	......
All diseases	4,085	193.88	30	1.42	3,005	116.24	31	2.25	2,914	225.59	27	2.09

	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	46	3.61	2	0.16	40	3.19	4	0.32	27	2.21	2	0.16
Yellow fever	100	7.86	29	2.28	31	2.48	1	.08	17	1.39	4	.33
Malarial infections	1,239	97.31	2	.16	1,395	111.40	3	.24	1,217	99.44	2	.16
Undetermined fevers	30	2.36	.....	......	52	4.15	.....	......	76	6.21	.....	......
Rheumatic affections	65	5.11	.....	......	78	6.23	.....	......	58	4.74	.....	......
Consumption	7	.55	.....	......	10	.80	.....	......	3	.25	.....	......
All venereal diseases	201	15.80	.....	......	191	15.25	.....	......	191	15.61	.....	......
Alcoholism and direct results	62	4.87	1	.08	56	4.47	3	.24	23	1.88	.....	......
Diarrheal diseases	607	47.68	.....	......	587	46.87	1	.08	383	31.29	1	.08
Pneumonia	4	.31	.....	......	.....	......	1	.08	2	.16	.....	......
Total respiratory	60	4.71	.....	......	79	6.31	1	.08	45	3.68	.....	......
All diseases	3,158	248.04	37	2.91	3,335	266.31	18	1.44	2,627	214.64	15	1.23

	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	14	1.26	2	0.18	14	1.26	2	0.18	16	1.46	2	0.18
Yellow fever	4	.36	2	.18	2	.18	.....	......	2	.18	1	.09
Malarial infections	1,357	121.69	3	.27	1,049	94.49	.....	......	667	61.00	1	.09
Undetermined fevers	195	17.49	.....	......	71	6.40	.....	......	19	1.74	.....	......
Rheumatic affections	79	7.08	.....	......	58	5.22	.....	......	45	4.12	.....	......
Consumption	3	.27	.....	......	.....	......	.....	......	6	.55	1	.09
All venereal diseases	190	17.01	.....	......	160	14.41	.....	......	198	18.10	.....	......
Alcoholism and direct results	45	4.04	.....	......	50	4.50	1	.09	26	2.38	.....	......
Diarrheal diseases	350	31.39	1	.09	279	25.13	1	.09	225	20.58	1	.09
Pneumonia	.....	......	.....	......	1	.09	1	.09	1	.09	.....	......
Total respiratory	50	4.50	1	.09	57	5.13	1	.09	53	4.85	1	.09
All diseases	2,887	258.91	10	.90	2,243	202.04	6	.54	1,724	157.68	12	1.10

YELLOW FEVER.

There is now no general military hospital in the Division of Cuba, but there are several post hospitals which by their capacity, accommodations, and the efficiency of their staffs are able to receive and care for all cases requiring special treatment.

Each of the posts has a well-equipped hospital provided with isolation wards for yellow fever and detention wards for all fevers of a suspicious character, until their nature has been satisfactorily determined. Thus each post is prepared to take care of its own yellow-fever patients. Each command is also prepared to move out of its quarters to selected grounds in case of the appearance of yellow-fever infection in its barracks.

During the fiscal year ended June 30, 1900, six outbreaks of yellow fever occurred involving our troops. The disease appeared first at Santiago, beginning in June, 1899, and continuing until October 15; 12 officers and 129 enlisted men became affected, of whom 5 officers and 26 enlisted men died. The report of this outbreak by Maj. L. C. Carr, surgeon, United States Volunteers, was submitted in my last annual report, page 251. The failure of the troops to move promptly from their infected quarters was the cause of this large death record in this garrison. Cases which occurred in July and August, 1899, in Puerto Principe and Cabana Fortress, Havana, also are recorded in my last annual report, page 261.

On March 5, 1900, the chief surgeon of the Department of Santiago and Puerto Principe caused the following circular to be issued for the guidance of the medical officers in his department:

CIRCULAR }
No. 2. }

HDQRS. DEPARTMENT OF SANTIAGO AND PUERTO PRINCIPE,
Santiago, Cuba, March 5, 1900.

[Prepared by the chief surgeon.]

In order to guard against the introduction and spread of yellow fever in this department, commanding officers, besides the provisions of Circular No. 22, of December 21, 1899, will, on April 1, 1900, or as soon thereafter as practicable, carry out the following special instructions. For this purpose they will direct their medical officers to seek the cooperation of the officers of the Marine-Hospital Service, and avail themselves of such hospital accommodations or disinfecting plants as may be offered by said service:

First. In all garrison towns and their seaports a census will be made of all nonimmune persons, so that the extent of susceptibility to infection may be known and adequate preparations made. Such census will naturally include all persons, not native, who have never had the disease.

Second. In seaboard towns especially, homeless and destitute nonimmunes (mostly loafers and tramps) are the most dangerous element of the population, and will, so far as practicable, be removed to the country, isolated, or placed in confinement under medical supervision.

Third. If a suitable building is not available, a sufficient number of tents will be pitched in an isolated spot and made ready for the admission and treatment of yellow-fever cases. Near this hospital, but not connected with it, should be another set of tents (detention camp) for the reception of all suspicious cases or cases coming from an infected locality.

The tentage will be furnished by the Quartermaster's Department, and the furniture, supplies, and medicines by the Medical Department.

Fourth. The necessary personnel will be selected and in readiness. In the absence of an army medical officer the commanding officer will make an agreement with the best civilian physician available, who will be prepared to take charge of the yellow-fever hospital on the day the first case breaks out, his compensation to begin from that day in accordance with contract to be made with him by the chief surgeon.

One immune attendant will be engaged and placed in charge as soon as the hospital is ready, at $30 per month and a ration, his pay to begin at once. If cases of yellow fever occur the chief surgeon will authorize as many nurses and attendants as may be necessary.

Fifth. Upon completion of the preparations prescribed in the above paragraphs, a report describing the names of persons selected or engaged and other action taken in carrying out the provisions of this circular will be forwarded to these headquarters.

Sixth. Civilians under treatment will be charged $1 a day, or only 50 cents if employees of the Government. If unable to pay, bills in duplicate may be sent to the chief surgeon for settlement.

Ice for the sick and lime for disinfection can be purchased by medical officers as already provided by the chief surgeon.

Seventh. All buildings known to have been infected in previous years will be carefully inspected, and, if deemed necessary, subjected to a fresh disinfection.

Eighth. Where no steam plant is available, disinfection of bedding and clothing may be effected by a small portable formaldehyde generator, or by thorough boiling in a mild sublimate solution, followed by complete exposure to sunshine. A hand pump, to throw a stream of sublimate solution against walls, floors, ceilings, etc., is always very useful, and will be supplied on application to the chief surgeon.

Ninth. All persons coming from infected localities will be kept isolated for five days at the detention camp and disinfected before being discharged.

Tenth. Cases of fever in nonimmunes should be carefully watched, and as soon as they become suspicious promptly removed to the detention camp.

All physicians will be ordered to report within twenty-four hours any suspicious cases under their care to the medical officer in charge.

All cases of yellow fever will be promptly wired to the chief surgeon.

Eleventh. According to general experience, the three most important symptoms upon which a diagnosis of yellow fever may be based in the first stage are:

(1) Injection and glistening of conjunctivæ, together with general congestion of the skin.

(2) Steadiness or falling of pulse, with rising temperature.

(3) Albumen in urine.

In order to appreciate properly the indications of pulse and temperature, they should be recorded not less than three times a day upon the usual chart. Such a chart should by itself by the end of the first week clear all doubts as to the nature of the fever.

By order of Colonel Whitside:

J. G. HARBORD,
First Lieutenant, Tenth U. S. Cavalry, A. A. D. C., A. A. A. G.

REGISTRATION OF NONIMMUNES.

Later, on July 3, 1900, on the recommendation of Maj. F. J. Ives, surgeon, United States Volunteers, chief surgeon of the Department of Matanzas and Santa Clara, the following circular concerning the registration of nonimmunes was published as a precautionary measure against the spread of yellow fever:

1. The mayors of the following cities, Matanzas, Cardenas, Colon, Cienfuegos, Santa Clara, Trinidad, Sancti Spiritus, Sagua la Grande, Caibarien, Placetas, and Remedios, should be required at once to prepare a list of all nonimmunes, exclusive of the officers and soldiers of the United States Army, but including the families of the above, and all civilian employees. In order to obtain this list a proclamation should be issued by the mayor requiring every nonimmune to be registered, stating in each case the full name and address, and whether an adult or child, all persons over 16 years being considered adults. In this proclamation the necessary measures for securing this information should be embodied. It should be clearly stated that any adult failing to comply and be registered at the end of ten days after the date of the order, would be fined at least $1 for every day that he or she remains unregistered, and the parent or guardian of any child will be fined an equal amount for all children not registered, in the same manner and amount as above.

The term immune should be construed to mean all natives of the island of Cuba, all foreigners who can establish a residence of at least ten years on the island, and all others who can produce a certificate from a reliable physician that they have had yellow fever. The term nonimmune signifies any person who is not immune as above described.

The proclamation should be written in both Spanish and English and conspicuously posted on the bulletin boards in front of each alcaldia. In addition it should also be advertised in the local papers.

2. Should yellow fever appear in any of the towns of this department to an extent sufficient to create apprehension of its being exported, the chief sanitary officer of the department will notify the mayor of the infected town to permit no nonimmune to leave the town without previously notifying the mayor, in writing, of the date of such departure and the destination. The mayor, upon being thus notified, will at once notify by telegraph the mayor of the town to which the nonimmune is going. The latter mayor will, upon the arrival of the nonimmune, ascertain his address and cause his chief sanitary officer, or one of the municipal physicians, to investigate the case and keep the case under observation until the period of infection has passed. Should the nonimmune be an officer or a soldier, or a member of the family of an officer or soldier, the commanding officer of the garrison from which he leaves should be required to notify the commanding officer of the garrison in the town where the nonimmune is going, and the military surgeons be required to take the necessary precautions. Should a nonimmune of the latter class be going to a town where there is no garrison, the commanding officer will notify the mayor of such town, who will take the same measures as in the case of those not connected with the military establishment. Should any nonimmune arrive from an infected town at any of the seaport towns, the quarantine officers of the port should be at once notified of that fact by the local municipal authorities, or by the military authorities in case of an officer or soldier or a member of the family of an officer or soldier.

There should likewise be a punishment for all nonimmunes failing to give the proper notifications to the municipal authorities, consisting of appropriate fines, or imprisonment, or both.

Notwithstanding the precautions taken an outbreak occurred at Santa Clara on May 10, 1900, which continued until the garrison moved into camp. Thirty-six officers and men became affected, of whom 10 died.

On May 19, 1900, an outbreak took place at Quemados, the headquarters of the Department of Havana and Pinar del Rio. Eleven officers and men were taken sick and two died. The infection did not reach the large post of Columbia Barracks, only half a mile distant. The chief surgeon of the department recommended as a measure for the suppression of the epidemic the removal of the nonimmunes of the village of Quemados into a camp about 2 miles distant; there were about 140 nonimmunes, of whom 84 were white Americans. This officer, Maj. Jefferson R. Kean, became affected with the disease, but his plans for its suppression were ably perfected and carried out by Capt. A. N. Stark, post surgeon, Columbia Barracks. After the removal of the nonimmunes, saloons, houses of prostitution, and all resorts where one could contract the disease were closed. A rural guard was placed on duty to arrest all soldiers or civilian employees found in the town. It was the intention to keep the nonimmunes in camp until November 15, the saloons and other resorts to be closed indefinitely.

On February 20, 1900, Capt. W. W. Quinton, assistant surgeon, United States Army, post surgeon at Guanajay Barracks, reported a case of yellow fever in the person of a soldier of the First United States Infantry, who was taken sick January 4, 1900, had black vomit on the 9th, and died next day. Post-mortem examination showed that there was no doubt of the character of the case. Every precaution was taken to prevent the spread of the disease and no other case occurred at that time.

Nothing more was heard of yellow fever at this post until July 4, 1900, when another soldier of the First United States Infantry became sick with fever, which, two days later, was recognized as yellow fever.

The patient was transferred to the civil hospital in Guanajay, where death occurred July 9. The disease was believed to have been contracted in the city. On July 20, 2 cases; on the 21st, 3 cases; on the 28th, 2 cases, and on August 7, 3 cases were reported, only 1 of which proved fatal. Meanwhile measures had been taken to prevent the spread of the disease. The barracks and hospital were cleared of all occupancy and disinfected with bichloride solution, the men meanwhile occupying tents at some distance from the infected buildings, and on August 24 Acting Asst. Surg. J. F. Dunshie, post surgeon, reported that no case had occurred in the command since August 7.

Lastly, at Pinar del Rio Barracks a sergeant of the First Infantry was taken sick May 10 and died on the 16th with what was recorded as pernicious malarial fever. Another case was reported June 14, and 4 others were taken on sick report during the remainder of the month. Only 1 of these 5 cases recovered. Twenty-seven men, 4 of whom were civilians, became affected in July; 8 of these died. The epidemic was suppressed by the removal of the troops into camp about 3 miles from the barracks. Only 2 cases occurred in the command after the infected barracks were abandoned. This move should have been made much earlier.

MUNICIPAL SANITATION.

During the year the medical officers serving in the Division of Cuba attended not only to their proper military work at their respective posts, but most of them discharged duties of a responsible character in connection with the sanitation of cities and towns. In Havana the work of sanitation has been carried on with much vigor, especially as regards the cleaning of streets, privies, and the interior of houses; but, according to Chief Surgeon Havard, the best results can not be expected until a new system of sewerage has been laid.

The following table, compiled by Maj. W. C. Gorgas, surgeon, United States Army, chief sanitary officer of the city of Havana, shows the mortality from yellow fever for citizens and soldiers, by months, from January, 1890, to May 31, 1900. From it may be seen the great mortality among the nonimmune Spanish soldiers sent from the Peninsula in 1896 and 1897 to suppress the Cuban insurrection. In 1896 there were 1,153 deaths of soldiers and only 135 of civilians; in 1897, 813 of soldiers and only 45 of civilians; in 1898, 111 soldiers and only 25 civilians died, the conditions during this year preventing the ingress of persons susceptible to the disease. The civilian deaths during these years were few as compared with the losses suffered by the Spanish troops. But in 1899, during the occupation of the city by United States troops, this relative mortality was reversed; 92 civilians died of yellow fever and only 11 soldiers, although up to the time the volunteers left there were over 20,000 troops in and about the city. This is creditable to the care taken by our medical officers.

The great fatality of yellow fever among the Spanish troops was the result of apathy, or a want of knowledge on the part of their medical officers of methods of prophylaxis. Their garrisons appear to have been left to suffer until the disease had spent itself by affecting all who were susceptible to its influence. The method of moving the troops from the infected locality, so successfully carried out by our medical officers under instructions from this office, does not seem to have been practiced by the Spanish authorities.

Deaths from yellow fever in the city of Havana.

Months.	1890.		1891.		1892.		1893.		1894.		1895.	
	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.
January	2	8	6	4	9	6	1	14	3	4	4	11
February	2	2	0	3	4	6	0	6	4	0	1	3
March	3	1	3	1	1	0	2	2	2	0	1	1
April	7	6	1	4	3	5	6	2	1	3	1	5
May	14	9	3	4	1	6	19	4	16	0	0	10
June	28	10	28	13	3	10	17	52	27	4	1	15
July	36	31	56	10	9	18	40	78	65	12	7	81
August	33	27	44	22	20	47	19	81	47	26	34	86
September	13	20	39	26	16	54	11	57	33	43	42	93
October	9	23	23	25	20	34	10	36	9	31	39	63
November	6	9	10	14	13	39	3	25	3	20	13	22
December	3	6	7	10	5	28	3	8	6	23	15	5
Total	156	152	220	136	104	253	131	365	216	166	158	395
Grand total	308		356		357		496		382		553	

Months.	1896.		1897.		1898.		1899.		1900.	
	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.
January	6	4	69	0	4	3	0	1	0	8
February	7	0	24	0	1	0	0	0	0	9
March	3	0	29	1	2	0	0	1	0	4
April	12	2	70	1	1	0	0	2	0	0
May	26	7	85	3	4	0	0	0	0	2
June	42	4	171	3	2	1	1	0	....	....
July	103	13	162	6	14	2	0	2	....	....
August	229	33	95	7	13	3	4	[illegible]	....	....
September	142	24	48	8	29	5	5	13	....	....
October	211	29	33	9	24	2	1	24	....	....
November	230	14	22	4	8	5	0	18	....	....
December	142	5	5	3	9	4	0	22	....	....
Total	1,153	135	813	45	111	25	11	92	....	....
Grand total	1,288		858		136		103		....	

REPORT OF MAJ. VALERY HAVARD, SURGEON, UNITED STATES ARMY, CHIEF SURGEON DIVISION OF CUBA, DATED AT HAVANA, CUBA, JULY 10, 1900.

I have the honor to submit the following report for the year ending June 30, 1900:

I was relieved from duty as chief surgeon, Department of Santiago and Puerto Principe, and directed to proceed to Havana and report to the commanding general Division of Cuba, for duty as chief surgeon of that division, by Special Orders No. 77, Adjutant-General's Office, April 2, 1900. I arrived at Havana and reported as ordered on April 23, 1900.

My predecessors in this office were Lieut. Col. R. M. O'Reilly, from January, 1899, to November, 1899, and Lieut. Col. Calvin De Witt, from January, 1900, to April, 1900.

At the time I took charge the general military hospitals, which after extensive and expensive repairs had been occupied by our numerous sick during the first year of the intervention, had become unnecessary and had already been turned over to the civil authorities. Although there is now no general hospital in the division, the departments have one or more post hospitals, which by their capacity, accommodations, and the efficiency of their staff are able to receive cases requiring special treatment.

During the year medical officers not only attended to their proper military work at their respective posts, but the great majority of them discharged other duties, often of an arduous nature, in connection with the sanitation of cities and towns and the management of civil hospitals. The department chief surgeons especially have been obliged to give these civil matters a large portion of their time and often the closest attention. Sanitation is such a modern science and has been so utterly neglected in Cuba that the progress of the education of the native profession and laity in that direction is necessarily slow, but not discouraging, and the results of this education will not be one of the least benefits of the intervention.

Yellow fever.—In view of the approaching yellow-fever season, one of my first cares was to verify the precautions taken and preparations made to avoid the contagion, and if cases occurred to isolate and treat them. These matters have been carefully attended to by the department chief surgeons. Each post is required to have a detention ward (where all cases of fever are admitted and kept until their nature is determined) and isolation wards.

Our largest posts consist of new frame structures, erected on high grounds, at some distance from neighboring towns, and therefore affording not only every hygienic advantage but also entirely free from the contagion of yellow fever and easily kept so.

A few of the old Spanish barracks are still occupied—as, for instance, at Pinar del Rio, Matanzas, Cardenas, etc. These barracks are not only dangerous in themselves, but being in towns they easily become infected or reinfected, as was shown at Santa Clara.

Each important post is prepared to take care of its own yellow-fever patients. As there is no garrison in the city of Havana, the rare cases which might occur at the Pirotecnia or at posts No. 4 or 5 can safely be taken care of at the regimental hospital of the Second Artillery, or at Las Animas hospital, while those which may occur on the east side of the bay will be admitted at the Cabana field hospital.

For all Americans, Government employees or others, who may contract the disease a ward has been fitted out at Las Animas hospital, where they are attended by English-speaking physicians and American trained nurses.

Spaniards who have immigrated during the past year, who now furnish and will continue to furnish the great majority of yellow-fever cases in Havana, are taken to the hospitals of the several mutual beneficial associations to which they belong. These hospitals are in the suburbs of the city and provided with contagious-disease wards more or less isolated. It would be a much more satisfactory plan to send all cases to Las Animas hospital, which is especially intended for yellow fever, but such a plan could not be carried out without doing violence to the habits and feelings of the patients and their friends, and it seems best at present to insist on the strict isolation and disinfection of the wards where such patients are received.

During the fiscal year ending June 30, 1900, there have been three outbreaks of yellow fever in Cuba, all involving our troops, more or less.

The first was at Santiago de Cuba, beginning in June, 1899, and continuing through the summer, or until no susceptible material remained within reach; 138 officers and enlisted men were taken sick and 30 died.

The second was at Santa Clara, beginning on May 10, 1900, and continuing through June, or until the garrison had been moved into camp and thoroughly disinfected; 36 officers and enlisted men were taken sick and 10 died. In this outbreak only soldiers and quartermaster's employees suffered, the exemption of citizens showing how completely they were immunized by the virulent epidemic which decimated the town in 1898. The outbreak originated in one or two houses close to the barracks, where several patients had died in 1898. Nonimmunes had occupied these houses in 1899 with impunity.

The third was at Quemados, the headquarters of the Department of Havana and Pinar del Rio, beginning on May 19, 1900, and continuing in June until all nonimmunes had been driven out of town; 11 officers and enlisted men were taken sick and 2 died. It has been attempted to connect this outbreak with that of Santa Clara, but as the two persons (man and wife) who form the connecting link came from that town to Quemados on April 1, and did not develop the disease until May 19, the demonstration is far from complete. It is also almost certain that a case of yellow fever died at Quemados last March, on General Lee street, thus showing previous infection.

The presence of a garrison of 2,000 or more men within a mile of Quemados was naturally a subject of great anxiety, but thanks to the very energetic measures recommended by Maj. J. R. Kean, chief surgeon, and (after he was taken sick) by his able successor, Capt. A. N. Stark, the contagion did not reach any portion of the post.

Our increased experience with yellow fever has shown us there is much about the nature, development, and communicability of the contagium of which we are ignorant. The laws governing this disease have not yet been discovered. It continues to strike when and where it listeth, regardless of our most reasonable expectations and best hygienic measures. Why the germ should remain quiescent and inactive one or two seasons in the presence of susceptible material and then suddenly become active and virulent, is a question still unanswered. The outbreak at Santiago last year was attributed, on what appeared good grounds, to the intensely hot and dry spring, while the outbreaks of this year at Santa Clara and Quemados are attributed, on equally good grounds, to the unusually heavy rains which fell in April and May. One thing appears to have been pretty well demonstrated and forms a valuable rule for our guidance; namely, that troops in uninfected buildings a few miles from yellow-fever foci can be saved from infection by simple but very strict precautions.

Health of troops in Cuba.—The eastern, middle, and western sections of Cuba offer no peculiarities of climate producing marked effects upon the health of troops. Thus, the total admissions per 1,000 of mean strength are 3,311 for the middle department, 3,299 for the eastern, and 3,066 for the western. The percentage of deaths is greatest in the eastern department and least in the western; this is accounted for by the sharp outbreak of yellow fever in Santiago in the summer of 1899. Malarial fever is everywhere, but most prevalent in the eastern region, diminishing westward, the proportions being 1,423 admissions per 1,000 of mean strength in Santiago and Puerto Principe, 1,126 in Matanzas and Santa Clara, and 576 in Havana and Pinar del Rio. Yellow fever has occurred in the three departments and is just as liable to break out in one as the other, no part of the island enjoying immunity against it.

The total number of deaths among the troops in Cuba during the year was 146, or 15.16 per thousand. In the United States Army during the decade preceding the Spanish-American war it was 6.99 and during the calendar year 1898 (from all causes) 27.55. This mortality of 15.16 per 1,000 is not high if we consider the number of admissions, and shows that of the diseases which incapacitate so many of our men few are dangerous to life. Of these the most dreaded is yellow fever, but the measures taken will almost certainly prevent its occurrence in the future among enlisted men, except as rare sporadic cases, producing but little effect upon the total mortality.

The admissions for typhoid fever per 1,000 of mean strength are 13.73, and the mortality 1.87, while in the United States Army during the calendar year 1898 the rate of admissions was 88.56 and the mortality 9.74. Typhoid fever is very rare among the natives of Cuba. When it attacks our troops it is almost always by imported infection. It should therefore be possible to completely eliminate this disease from the island.

Not a single case of smallpox occurred during the year, and only two of measles.

The total admissions for diarrhea and dysentery per 1,000 of mean strength is 317, and the mortality only 0.73. In the United States during the decade preceding the Spanish-American war the admissions were 107 and the mortality 0.10, but during the calendar year 1898 these figures rose to 304 admissions and 2.14 deaths. Our figures for Cuba show by comparison a very large number of cases with a very low mortality.

The number of cases of venereal diseases throughout this division is very high. I regret to have no figures to show its accurate extent, but it forms by far the largest item of the column of "All other diseases." It is the burden of complaint of most post surgeons that about one-half of their patients are of this class. Of the various measures suggested and applied to mitigate this serious and widespread evil, none appears to have had the decided success which followed that of Maj. F. J. Ives, chief surgeon of Matanzas and Santa Clara, and which will be fully reported on by himself. It consists in subjecting all enlisted men to weekly examination, treating those who show signs of disease and depriving them while under treatment of the pass and canteen privileges; thus not only are all cases early submitted to proper treatment, but prevented from becoming aggravated by fresh exposure or the use of stimulants. This system, at first opposed by officers, has given such excellent results that it now meets with nothing but commendation at the posts where it is in operation.

Hygiene of posts.—The examination of the monthly sanitary reports from the posts reveals nothing of much importance. No sanitary defect has been complained of that was not remedied so far as possible. The disposal of garbage and excreta is everywhere receiving particular attention; where sewers are not available, the dry earth and lime system, or milk of lime system with excavator, are used with entire satisfaction. The clothing appears very satisfactory. I believe the campaign hat would be very much improved by an all-round ventilator, as in the helmet. Of the food I can only say that it is what the captain of the company, his first sergeant, and cook choose to make it; the needful materials are amply provided by the ration. It is true that green fresh vegetables are scant and expensive in the markets, but at permanent posts they can be produced abundantly. Man eats less in the Tropics; less fuel is required to keep up animal heat, especially when but little physical energy is expended; but of this reduced quantity of food it is questionable, judging from rather extensive practical observation, whether the relative proportion of meat is less or should be less than in the United States. Of the native fruits all are perfectly wholesome if mature and not overripe, and I have not yet seen any ill effects from eating them, even in large quantity. The soldier coming from the United States does not realize the importance of accommodating his habits to the requirements of a tropical climate by cultivating temperance in eating and drinking, and in this way avoiding the many diarrheal and other troubles from which he suffers. It would be greatly to his advantage were he to imitate the admirable sobriety of the Cubans.

Havana.—The work of sanitation in the city of Havana has been carried on with much vigor during the year, especially as regards the cleaning of the streets, privies, and interior of houses; but such work is necessarily imperfect and can not give the best results until a new complete system of sewerage has been laid. Enough has been done, however, to have a decided effect upon public health, especially during the past three months, as shown by the lowering of the death rate to 24 per thousand for the month of May, the last for which the rate has been computed. Maj. W. C. Gorgas, surgeon, United States Army, chief sanitary officer, deserves special commendation for his untiring efforts in the discharge of his manifold duties.

From a very interesting (as yet unpublished) "Note on mortuary record of yellow fever in Havana, 1884–1900," generously placed at my disposal by the author, the well-known yellow-fever expert, Surg. H. R. Carter, of the Marine-Hospital Service, I quote the following extracts:

"The belief that seems prevalent among Americans that it is safe to come to Havana in November and perfectly safe in December, but that they must leave with the early summer, is absolutely without basis. May will average safer than January. In not a few years June is safer than December, and it is fair to class from June to December, inclusive, as a period of danger, and from January to May, inclusive, as comparatively safe, January being the most dangerous month of this division of the year.

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"What, however, most impressed the writer when he compiled these figures was the small number of deaths among the civilian population, 210.4 per annum being the average for the ten normal years preceding 1895 and 195 per annum for the last seventeen years. We must note, too, that these figures for civilian deaths are somewhat too high, including, as they do, a few soldiers.

"During this time, then, seventeen years, there has never been any death rate among the civilian population even approaching to the epidemics of our own country—compare with 7,800 deaths in New Orleans in 1853. Yellow fever for seventeen years has not been a marked factor in the civil mortality per annum in Havana.

* * * * * * *

"The books in my office show that civilian immigration nearly ceased after 1895 and that it was not resumed until in August, 1899. This is doubtless the reason why 1896, 1897, and 1898 were years of small civilian mortality, while 1896 and 1897 pile up the highest military mortality ever known here: 1896, civil 141, military 1,579; 1897, civil 61, military 1,083.

"In 1898 the bulk of susceptibility among the soldiers must have been exhausted, as a garrison of 29,000 to 30,000 gave only 333 deaths. The same is true of civilians, for whom we record only 31, the lowest number in the history of Havana which we have recorded. Among the deaths in November and December are those of a small number (5, I believe) of Americans who had come to Havana, believing these months to be free from danger.

* * * * * * *

"Up to the end of August the civilian mortality for this year (1899) was extremely small, and for August and September was decidedly less than the normal before the war, although greater than for the two preceding years. Instead of reaching its maximum, however, in August and September, the October mortality nearly doubled its September figure and December's was only 2 less. It suffered a marked change in January, but extended into March, and reached its lowest, 0, in April of this year. May has given us a mortality of only 2.

"The run of the fever in 1899 was very much like that of 1885, both giving exactly the same mortality, 111, the smallest of any in the normal ten years' series. In both there was the fairest promise, until August in 1885, September in 1899, and then an unusually rapid increase, dying down, however, more quickly in 1885 than in 1899. In the latter, indeed, we had a real winter epidemic, as in 1888 and 1892, and with the exception of these two years the three winter months of 1899–1900 give a higher mortality than the corresponding months of any of the seventeen years I have recorded.

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"To my mind the cause of the increase of mortality in the fall and winter was exactly the same, reversed, as caused the low mortality in 1897 and 1898, i. e., the changed movement of the Spanish immigration. Just as a cessation of this movement after 1895, by ceasing to supply susceptible material, gave us the low death rate (of yellow fever) of 1896, 1897, 1898, and the early part of 1899, so its recrudescence in the latter part of August, by furnishing susceptible material exposed to infection, gave us our winter epidemic of 1899."

One of the most interesting tables in the "note" is that showing the comparative mortality for five years, among civilians, of yellow fever and tuberculosis, the average per annum for yellow fever being 221 cases and for tuberculosis 1,492, so that the author feels justified in remarking that "compared with tuberculosis, the influence of yellow fever on the general mortality of the city is insignificant."

Stations.—The number of headquarters, posts, hospitals, and depots on Juue 30 requiring the services of medical officers was as follows:

Headquarters, 4; garrisoned posts, 28; yellow-fever hospitals or stations, 6; supply depots, 2.

Of the garrisoned posts 12 are in the Department of Santiago and Puerto Principe, 9 in the Department of Matanzas and Santa Clara, and 7 in the Department of Havana and Pinar del Rio.

Of the yellow-fever hospitals and stations 1 is at Santa Clara, 1 at Quemados, 1 in Havana, and 4 in the Department of Santiago and Puerto Principe.

Six medical officers are also on special duty as sanitary officers in cities, and in charge of Government employees.

Medical officers.—The medical officers on duty in the Division of Cuba on June 30 were as follows:

United States Army:	
Surgeons with rank of major	3
Assistant surgeons with rank of captain	2
Assistant surgeons with rank of first lieutenant	9
United States Volunteers:	
Surgeons with rank of major (2 being captains and assistant surgeons, United States Army)	8
Acting assistant surgeons	55
Total	77

This list presents peculiar features which call for notice. The first is the absence of medical officers above the rank of major. Another is the small number of regular medical officers, especially of major-surgeons, so that of the three department chief surgeons two are captains and assistant surgeons, with volunteer rank of major, and one is a major of volunteers.

One of the inevitable results of this scarcity of regular medical officers is that all of our large and important posts are in charge of junior commissioned officers or of contract surgeons; thus the largest post on the island, Columbia Barracks, with a garrison of 2,000 men, is in charge of an assistant surgeon with rank of captain, and so is Pinar del Rio, with a garrison of 800 or more men. Posts of four or five companies, with band and headquarters, like Rowell Barracks, Puerto Principe, Santa Clara, and Guanajay, are in charge of assistant surgeons with rank of first lieutenant. Such young officers are as able and efficient as could be expected, but necessarily lack the experience required to meet the responsible duties made to devolve upon them. But even junior officers are not sufficient for all our large garrisons, and we have such posts as Cabana, Morro Castle (Santiago), and Holguin in charge of contract surgeons.

The most striking feature of the list of medical officers submitted above is the great preponderance of civilian physicians under contract, or acting assistant surgeons. Even at posts where the surgeons are commissioned officers all their assistants, as a very general rule, are contract surgeons, so that we may correctly state that the great majority of our sick soldiers in Cuba (and elsewhere) are under the professional care of contract surgeons.

Enlisted men, especially in the Tropics, are entitled to the best medical attendance, and it is a fact that they do not and can not receive it under the present system, and that a great injustice is done them. Contract surgeons are not qualified by professional attainments or military experience and knowledge to perform successfully the duties required of them. This is so obvious to all that I need not dwell upon it. To become an efficient medical officer (that is, not only to be able to prescribe for the sick and perform operations, but to point out and remedy all causes tending to produce disease and inculcate the spirit of military discipline, without which army nurses and attendants are useless) requires several years of special study and careful attention to duty, and this can not be expected from civilian physicians whose service in the Army is casual and temporary. The remedy for this great evil is plain enough, and I only follow in the footsteps of the Surgeon-General in recommending and urging a large increase of the regular medical corps, so that the necessity for the employment of so many contract surgeons may cease to exist.

General conclusion.—To maintain the health and efficiency of United States troops on this island requires great care and particular precautions. They must be kept away from the hot sun and only exercised or drilled in the morning and evening. Their barracks must be on high, well-drained grounds, swept by breezes, away from towns, with good and abundant water supply and excellent sewerage. In this manner all infectious diseases, including yellow fever, can be avoided. It will be impossible, however, to prevent malarial fevers, diarrheal troubles, the result of improper diet or indiscretions in food and drink, and venereal diseases. These troops will doubtless exert a strong moral effect merely by their presence, and this may be enough for their raison d'etre; but should they be required to take the field and enter upon active campaign the result from a sanitary point of view would, I fear, be disappointing. After two or three weeks' exposure to the elements it is probable enough that the experience of Santiago would be repeated; that at least one-half of the command would become disabled from malarial fevers, and that the deadly effects of yellow fever and other infectious diseases would soon be superadded.

DISINFECTION IN HAVANA.

A plant for the electrolysis of sea water, on what is known as the Woolf system, was put into practical operation in Havana in July, 1899. It was claimed that the water so treated had an average chlorine strength of 0.16 per cent, equal to 100 grains of chlorine to the gallon. This was distributed in wagons for use in disinfecting sewers, street sprinkling, and household disinfection. On the request of Maj. Gen. Leonard Wood, United States Volunteers, for an investigation into the value of this method of disinfection, Maj. Walter Reed, surgeon, United States Army, was sent to Havana to make the desired examination. Major Reed found that the chlorine strength supposed to be obtained was not reached in practice. In observations covering a period of ten days the available chlorine in the electrolysed sea water, or electrozone, varied from a maximum of 0.142 to a minimum of 0.021 per cent, or from 89.9 to 12.2 grains per gallon. A chlorine strength of less than 0.15 per cent can not be relied upon for prompt disinfection. A solution containing 0.25 per cent is, in fact, desirable. He concluded, therefore, that the electrozone as used in Havana did not possess sufficient strength for efficient and reliable disinfection. His experiments showed that a solution of sodium hypochlorite of equal chlorine percentage is just as effective in germicidal action as electrozone, and the same is true of chlorinated lime to which enough of hydrochloric acid has been added to free the whole of the chlorine. Comparing the cost of manufacture, he states that a chlorinated lime solution having a strength of 146 grains of available chlorine per gallon could have been used in Havana in quantity equal to that of the electrozone used from July 1, 1899, to March 31, 1900, at a cost of $17,802, while on the other hand the cost of the electrozone plant, the interest on this cost, and the daily expenses of management amounted to $87,033, as the cost of furnishing a like quantity of electrolysed sea water having no particular standard of strength, but certainly of a less strength than that which could have been obtained from the chlorinated lime. He therefore disapproved of the proposition to extend the Havana system of disinfection to other cities in Cuba.

Report of Maj. Walter Reed, Surgeon, United States Army, on the Practical Use of Electrozone as a Disinfectant in the City of Havana, Cuba, April 20, 1900.

In compliance with paragraphs 15 and 16, Special Orders, No. 51, Adjutant-General's Office, March 2, 1900, I have the honor to submit the following report embodying my investigation concerning the practical use of electrozone in the city of Havana, together with the results of tests made to determine the germicidal value of this fluid:

The plant established in Havana by the chief engineer of that department was put into practical operation during the month of July, 1899. The method used for the electrolysis of sea water is that known as the Woolf system, and may be briefly described as consisting of eight circular, open, wooden vats arranged in pairs and each capable of holding 1,000 gallons of sea water. For each of the vats there are provided fifty-two positive and fifty-three negative electrodes, the former consisting of an alloy of platinum and iridium and the latter of zinc. As stated, these circular vats are connected in pairs and both receive, at all times when in operation, the same strength of electric current. For the four pairs of vats, therefore, four dynamos are provided.

These vats having been filled at 7 a. m. with sea water, a current having a strength normally of 3,000 ampères, with a voltage of 12–13, is passed through the water for the space of two and one-half hours. At the end of this time 200 gallons (20 per cent) are drawn from each vat and passed into two open wooden receiving tanks, which stand on the street below. Two hundred gallons of sea water are then pumped into each vat to supply the place of that removed, and at the expiration of thirty minutes 200 gallons are again passed from each vat into the receiving tank. This is repeated throughout the day's run.

It is stated that by this procedure there is produced and maintained an average strength of 100 grains of available chlorine to the gallon (0.16 per cent), which would appear to be the strength desired.

The plant is at present at work during eight hours of the day, turning out, as stated by the assistant superintendent, 24,000 gallons of electrozone, having a strength of 80–100 grains of available chlorine per gallon. The capacity of the plant, if run during the twenty-four hours, is said to be 100,000 gallons of the strength above indicated.

From the receiving tanks, each of a capacity of 5,000 gallons, the disinfectant is drawn off into closed distributing carts at all hours of the day and night and carried to various parts of the city for sewer, street, and household disinfection. I was informed by Colonel Black, chief engineer, that at present about 12,000 gallons are used daily for sewer disinfection and about 8,000 gallons for street sprinkling, those streets being selected for daily sprinkling which are located in the old part of the city, where yellow fever has been more prevalent during the past years.

For the purposes of sewer disinfection certain water-tight receptacles, having a capacity of several hundred gallons, are provided in connection with the sewers, and from these, by means of a half-inch opening, a small stream of electrozone is allowed to flow into the sewer. By this method disagreeable odors have been entirely abated and a certain degree of disinfection supposedly obtained.

As regards household disinfection, I was informed by Maj. W. C. Gorgas, chief sanitary officer, that about 4,000 gallons of electrozone were being daily used for the purpose only of cleansing and disinfecting the floors of such houses as were selected for disinfection, bichloride of mercury solution being relied upon for the disinfection of walls, etc. It will thus be seen that electrozone is being put to practical use in the city of Havana for three purposes, viz, street sprinkling, sewer disinfection, and the disinfection of floors.

After a consideration of the germicidal value of this fluid, I will again refer to its use for these several purposes.

I may here state that at the time of my first visit to the plant (3 p. m. March 11) I was impressed with the fact that although a certain standard of strength as regards available chlorine was supposed to be obtained, this was not arrived at in actual practice. At my request, the assistant superintendent kindly tested, by the arsenious acid method, the fluid contained in two vats, with the result that while one gave 0.319 per cent of available chlorine, the other contained only 0.073 per cent. A test of the fluid contained in the two distributing tanks gave, for tank No. 1, 0.071 per cent of available chlorine, while that contained in tank No. 2 gave 0.060 per cent. A second test of the fluid contained in tank No. 1, made a half hour later, gave 0.142 per cent of available chlorine.

The varying strength of electrozone, as regards its available chlorine, will be best shown by the result of the tests that were made from time to time with the fluid contained in the distributing tanks.

TABLE I.

Date.	Per cent of available chlorine.		Date.	Per cent of available chlorine.	
	Tank No. 1.	Tank No. 2.		Tank No. 1.	Tank No. 2.
arch 11, 3 p. m.	0.071	0.060	March 19, 11 a. m.	0.021	0.049
arch 11, 3.30 p. m.	.142		March 20, 8.50 p. m.	.056	.052
arch 13, 3.30 p. m.	.102	.095	March 20, 10 a. m.	.071	.070
arch 14, 2.30 p. m.	.142	.110	March 20, 4.30 p. m.	.070	.070
arch 15, 2 p. m.	.106	.094			

Thus in observations extending over a period of ten days the amount of available hlorine varied from 0.142 to 0.021 per cent, or from 82.9 to 12.2 grains per gallon. he arsenious-acid method was used in determining the available chlorine.

As it will be later shown that the disinfectant value of electrozone depends upon e amount of its available chlorine and that the latter is rapidly lost from the soluon, it can be inferred that the fluid in actual daily use must have varied markedly its disinfectant quality.

Through the courtesy of Colonel Black I was enabled on March 20 to make a ractical test as to the amount of available chlorine which could be produced by the lectrolysis of sea water under this system, and on March 27 to test the capacity of he entire plant during a three hours' run.

For the first test one vat only was selected for observation, although, of course, the ame strength of chlorine was probably produced in its companion vat; but sufficient ime could not be given to the estimation of the strength of both vats. The conditions were favorable for the best results, as the electrodes had been thoroughly leaned and were in good working order.

The result of this trial is given in the following table:

TABLE II.

Strength of current, 3,000–3,500 ampères, voltage 12–14, acting upon 1,000 gallons of sea water during the period of eight hours.]

Time.	Percentage of available chlorine.	Grains of chlorine per gallon.	Time.	Percentage of available chlorine.	Grains of chlorine per gallon.
hour	0.046	26.87	4½ hours	0.277	161.82
hour	.078	45.56	5 hours	.323	188.69
½ hours	.106	61.92	5½ hours	.351	205.05
hours	.129	75.36	6 hours	.379	221.41
½ hours	.156	91.13	6½ hours	.418	244.19
hours	.191	111.58	7 hours	.433	252.95
½ hours	.213	124.43	7½ hours	.443	258.80
hours	.248	144.88	8 hours	.454	265.22

It was observed that during this trial the strength of current supplied to the three remaining pairs of vats varied from 500 to 1,800 ampères. A test of the fluid in two of these, made at 3 p. m., gave only 0.070 per cent of chlorine. This fluid was being passed into the distributing tanks for general distribution.

The result of three hours' trial of the entire system of vats is given in the following table:

TABLE III.

Sets.	Time.	Per cent of available chlorine.	Grains of chlorine per gallon.	Strength of current.
No. 1	½ hour	0.024	14.02	
	1 hour	.056	32.71	1,900 ampères, 13 volts.
	1½ hours	.081	47.32	2,300 ampères, 13.5 volts.
	2 hours	.095	55.49	2,500 ampères, 13 volts.
No. 2	½ hour	.053	30.96	
	1 hour	.067	39.14	2,500 ampères, 12 volts.
	1½ hours	.078	45.56	
	2 hours	.110	64.26	2,950 ampères, 12.5 volts.
	2½ hours	.142	82.95	
	3 hours	.152	88.79	2,800 ampères, 12.3 volts.

TABLE III—Continued.

Sets.	Time.	Per cent of available chlorine.	Grains of chlorine per gallon.	Strength of current.
No. 3	½ hour	.031	18.11	
	1 hour	.067	39.14	
	1½ hours	.088	51.40	
	2 hours	.106	61.92	
	2½ hours	.131	76.53	2,400 ampères, 13 volts.
	3 hours	.177	103.40	2,300 ampères, 12.75 volts.
No. 4	½ hour	.042	24.53	
	1 hour	.074	43.23	
	1½ hours	.099	57.83	
	2 hours	.124	72.44	3,400 ampères, 14.2 volts.
	2½ hours	.152	88.79	2,300 ampères, 12.5 volts.
	3 hours	.188	109.82	2,250 ampères, 12.5 volts.

During this trial a heavy rain storm was prevailing which interfered with the filling of two of the vats, and hence the test with these covered a two hours' run only. A small amount of rain water entered the several vats, but not enough, it is believed, to warrant any alteration of figures. On the contrary, the result obtained in set No. 4 was higher than it would otherwise have been, owing to a leakage of about 200 gallons that occurred during the test. So that the results obtained in sets Nos. 2 and 3 may be taken to fairly represent the capacity of the entire plant during a three hours' run, under the most favorable conditions of preparation therefor. It will be seen that the available chlorine obtained amounted to 0.150 and 0.170 per cent, respectively. In other words, that 8,000 gallons of electrozone having a chlorine strength of 0.160 per cent or 93.47 grains per gallon, can be manufactured every three hours, or a possible 24,000 gallons in a nine hours' run.

This result can not be obtained, however, in the regular course of daily work, since much time must be given especially to cleaning electrodes, so that practically two vats are thrown out of use every fifth day. I believe that it would be more correct to say that the plant can produce during a nine hours' run 24,000 gallons of electrozone, having a strength of 0.150 per cent or 87.63 grains of chlorine per gallon.

I was informed by one of the gentlemen on duty in the chief engineer's office, who was present during the test, that theoretically a current of 3,000 amperes should produce 20 grains of chlorine per gallon per ampere hour. A calculation made at the end of the three hours' run showed, however, that only 12 grains of available chlorine had been obtained per ampere hour.

THE GERMICIDAL VALUE OF ELECTROZONE.

Electrolyzed sea water or electrozone is a clear fluid, having a decided odor of chlorine. Its specific gravity appears to be the same as that of the sea water from which it is made, viz, 1027. It bleaches both blue and red litmus paper. This effect is brought about more slowly by solutions containing 0.050 per cent of available chlorine, but takes place at once by solutions having a chlorine strength of 0.100 to 0.250 per cent. Its reaction appears to be neutral. Repeated transfers of small quantities of this fluid to nutritive media showed that it was sterile. In order to ascertain how long the current must flow to bring about the destruction of the bacteria present in sea water, plates on agar were made from the sea water with which the vats were filled at intervals of five minutes for the first hour and then at ten-minute intervals during the second hour. The strength of current at the beginning of the observation was 500 amperes with 11.5 volts. After five minutes it had reached a strength of 2,500 amperes 11.5 volts and after seven minutes 3,000 amperes 13.5 volts. This strength was thereafter continued during the experiment. The material for plating was taken midway between the electrodes and the edge of the vat and at a depth of about 10 inches. The result obtained is given below:

TABLE IV.

	Per c. c.		Per c. c.
Number of bacteria in specimen of sea water.	832	After 45 minutes electrolysis	0
After 5 minutes electrolysis	504	After 50 minutes electrolysis	26
After 10 minutes electrolysis	244	After 55 minutes electrolysis	26
After 15 minutes electrolysis	338	After 60 minutes electrolysis	0
After 20 minutes electrolysis	156	After 70 minutes electrolysis	0
After 25 minutes electrolysis	260	After 85 minutes electrolysis	0
After 30 minutes electrolysis	54	After 100 minutes electrolysis	0
After 35 minutes electrolysis	26	After 120 minutes electrolysis	0
After 40 minutes electrolysis	104		

It would appear, therefore, that all the bacteria present are destroyed by electrolsis at the end of about one hour. As the number of bacteria per cubic centimeter f Havana Harbor water was less than had been anticipated, a second observation as made after one week. This test gave 2,158 colonies to the cubic centimeter of a water, or an average of 1,495 colonies for the two trials.

For the purpose of determining the germicidal value of electrozone, equal parts of is fluid and of bouillon cultures of several micro-organisms, grown in the thermo-at, were mixed and transfers made to sterile bouillon tubes after intervals varying om one minute to one hour. The latter tubes were kept at thermostat temperature om ten days to two weeks and the results carefully noted.

TABLE V.

[Electrozone containing 0.050 per cent (29.21 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.															
	1.	2.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
taphylococcus pyog. aureus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
yphoid bacillus	+	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—
olon bacillus	+	+	+	+	+	+	—	—	—	—	—	—	—	—	—	—

Subsequent observations showed that this strength of electrozone did not destroy taphylococcus aureus after eighteen hours' exposure.

TABLE VI.

[Electrozone containing 0.100 per cent (58.42 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
. pyog. aureus	+	+	+	+	+	+	+	+	—	—	—	—	—	—	—
yphoid bacillus	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—
olon bacillus	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
acillus icteroides	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE VII.

[Electrozone containing 0.150 per cent (88 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
. pyog. aureus	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—
yphoid bacillus	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
olon bacillus	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
acillus icteroides	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
. prodigiosus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
nthrax spores	+	+	+	+	+	+	+	+	+	—	—	—	—	—	—

TABLE VIII.

[Electrozone containing 0.250 per cent (146 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ypphoid bacillus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Colon bacillus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bacillus icteroides	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Anthrax spores	+	+	+	—	—	—	—	—	—	—	—	—	—	—	—

The foregoing observations embraced in Tables V to VIII demonstrate that while solutions containing 0.050 and 0.100 per cent of available chlorine possess to a certain extent germicidal qualities these solutions can not be considered as efficient disinfectants. In order to bring about the prompt destruction of the test bacteria, solutions containing 0.150 to 0.250 per cent of available chlorine must be used. It must also be borne in mind that electrozone is a very unstable preparation, and that it rapidly loses its chlorine content, upon which its germicidal value would appear to depend. This is shown in the following table:

TABLE IX.

Date.	Per cent of available chlorine.	Date.	Per cent of available chlorine.
March 14, 3.30 p. m	0.150	March 15, 10 a. m	0.095
March 18, 4 p. m	.410	March 19, 10 a. m	.280
March 20, 6 p. m	.454	March 21, 10 a. m	.374
March 22, 10 a. m	.259	March 22, 1.30 p. m	.216

In the first two observations the sample of electrozone was contained in dark-colored bottles, tightly closed with a cork stopper; in the third it was contained in a Squibb's chloroform bottle, with ground-glass stopper, and kept in an ice box till reexamined, while in the fourth observation the fluid was purposely left in an open vessel.

To what the instability of this preparation is due, even when kept in tightly stoppered vessels, I am unable to state. It may be attributed either to further oxidation of organic matter present in the solution, or more probably to recomposition of its chemical constituents. At any rate, this unstableness of electrozone is fully appreciated by the officer in charge of the plant, and hence an effort is made to use the fluid as soon after its manufacture as possible. Since, however, it is manufactured in open vats and stored in open tanks it can not fail to continually lose its chlorine strength, and hence to reach its destination with lessened germicidal value.

By reverting now to Table I, it will be seen that the strongest preparation of electrozone found in the distributing tanks during a period of 10 days contained 0.142 per cent of available chlorine, a percentage which was to some extent lessened before its application as a disinfectant. I have already shown that a less chlorine content than 0.150 per cent can not be relied upon for prompt disinfection. A solution containing 0.250 per cent of available chlorine is to be desired. Even a solution of this strength would, after 3 to 6 hours, fall approximately to one containing 0.200 per cent of chlorine. It follows that the electrozone heretofore used in Havana has not possessed sufficient chlorine strength to have rendered it an efficient and reliable disinfectant for practical work.

In order to further test the disinfectant value of electrozone, the following experiments were made:

Experiment I.—Equal parts of electrozone (0.130 per cent chlorine) and a thin watery sewage containing 5,000,000 bacteria to each cubic centimeter were mixed. An agar plate made with one loop of the mixture gave after 1 minute 25 colonies, after 5 minutes 10 colonies, and after 1 hour 4 colonies. A bouillon transfer made after 24 hours gave a growth of nonspore-bearing bacilli.

Experiment II.—Equal parts of electrozone (0.250 per cent chlorine) and thin sewage were mixed, with the following result: Plate after one-half minute, 8 colonies; plate after 2 minutes, 2 colonies; plate after 30 minutes, 16 colonies. Bouillon transfer after 24 hours gave a growth of nonspore-bearing bacilli.

The foregoing experiments show that while these examples of electrozone, when mixed in equal parts, did not completely sterilize the sewage, the number of bacteria were promptly and markedly reduced.

Experiment III.—Electrozone (0.150 per cent chlorine) was mixed with a sample stool in the proportion of 1 part to 1 part, 2 parts to 1, 3 parts to 1, and 4 parts to 1 of the stool. The latter was made by adding 10 grams of solid fæces to 30 c. c. of urine and the two thoroughly mixed with a glass rod. Some escape of fine gas bubbles to the surface of the liquid was observed. Plates made after 2, 6, and 24 hours gave numerous colonies of the colon bacillus in all of the mixtures.

Experiment IV.—To a sample stool consisting of 10 grams of fæces and 40 c. c. of urine, well stirred, were added 150 c. c. of electrozone containing 0.280 per cent of available chlorine. There was prompt evolution of numerous fine gas bubbles, which collected as a layer at the surface, with temporary bleaching of the amber color of the mixture.

A test for the available chlorine in the latter after 3 hours gave 0.035 per cent. Plates made after 3, 12, and 24 hours gave numerous colonies.

Experiment V.—Semisolid fæces, 10 grams; urine, 20 c. c., and electrozone (0.370 per cent chlorine), 300 c. c., or in the proportion of 10 pints of this stronger electrozone to 1 pint of stool, were mixed. Bouillon transfers made after 5 minutes, 6 hours, and 24 hours gave a good growth. Agar plates made after 16 hours and 24 hours gave numerous colonies of nonspore-bearing bacilli.

The foregoing experiments would indicate that where there is much organic matter present, and especially in the form of particles of moderate size, the chlorine content of electrozone (0.370 per cent chlorine) is entirely exhausted prior to the complete disinfection of the mixture.

Where, however, this stronger electrozone is brought in contact with thoroughly decomposed fæcal material, the disinfection may be complete after a comparatively short interval, as shown in the following experiments:

Experiment VI.—To a thoroughly decomposed sewage (20,000,000 of bacteria to the cubic centimeter) consisting of fæcal matter, 1 part, and urine, 30 parts, were added varying proportions of electrozone (0.250 per cent chlorine) from 1 to 1 to 6 to 1 of sewage. The solutions made with 1 part of sewage to 5 and 6 parts of electrozone were rapidly bleached with much frothing. Transfers made to sterile bouillon after 2 hours' interval gave no growth in any of the mixtures.

Experiment VII.—To 1 part of fluid sterile fæces, with which a bouillon culture of the typhoid bacillus had afterwards been mixed, was added 4 parts of electrozone (0.250 per cent chlorine). Plates made after 10, 20, 30, and 60 minutes showed no colonies. In other words, in order that these stronger solutions of electrozone may bring about the complete disinfection of sewage the organic matter must be in a state of extremely fine suspension, which we do not ordinarily find in the practical disinfection of sewage or stools. In all the foregoing experiments, although disinfection was not accomplished in the majority, the obnoxious odors of all were promptly suppressed by the addition of electrozone.

Returning, now, to the practical use of electrozone in the city of Havana, I may say that the small quantity allowed to enter the sewers could only act as a deodorizer, and in no sense of the word as a disinfectant. Could the several sewers of the city be filled with this solution and kept full for the period of 24 hours, complete disinfection would hardly be accomplished. It is idle, then, to speak of this agent as a disinfectant for the sewage of the city.

As a surface disinfectant for walls and floors the stronger solution (0.250 to 0.450 per cent chlorine) will undoubtedly be found effective, but not the weaker solutions heretofore used. For covering the surface of material recently removed from sewers, before it can be carted away, it will accomplish good by surface disinfection and the removal of foul odors.

As regards the matter of street disinfection by sprinkling, it must be remembered that under Colonel Black's supervision the streets of Havana, as far as I was able to judge, are kept in a remarkably clean condition and quite free of all surface refuse. Under these circumstances, far more efficient disinfection is effected by direct sunlight than could be expected from the use of any disinfectant solution. Hence I can but think that the sprinkling of streets with electrozone is entirely superfluous, except for the purpose of allaying dust.

It only remains to compare the disinfectant qualities of electrozone with solutions of other hypochlorites, such as those of sodium and calcium containing the same equivalent of available chlorine.

Since my return from Havana I have been engaged in this comparison, making use of the same method for determining the available chlorine present. The results obtained are recorded below:

TABLE X.

[Solution of sodium hypochlorite, 0.100 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	+	—	—	—	—	—	—	—	—
Typhoid bacillus	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Colon bacillus	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bacillus icteroides	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE XI.

[Solution of sodium hypochlorite, 0.150 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Typhoid bacillus	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XII.

[Solution of sodium hypochlorite, 0.250 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	−	−	−	−	−	−	−	−	−
Typhoid bacillus	−	−	−	−	−	−	−	−	−
Colon bacillus	−	−	−	−	−	−	−	−	−
Bacillus icteroides	−	−	−	−	−	−	−	−	−
Anthrax spores	+	+	−	−	−	−	−	−	−

TABLE XIII.

[Solution of chloride of lime, 0.100 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Typhoid bacillus	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

TABLE XIV.

[Solution of chloride of lime, 0.150 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−
Typhoid bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XV.

[Solution of chloride of lime, 0.250 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	+	+	+	+	−	−	−	−	−
Typhoid bacillus	+	−	−	−	−	−	−	−	−
Colon bacillus	+	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	−	−	−	−	−	−
Anthrax spores	+	+	+	+	+	+	+	+	+

An examination of the foregoing observations (Tables X–XV) will serve to show that while the solutions of sodium hypochlorite (Labarraque's solution), of equal chlorine percentage, were just as effective in germicidal action as electrozone, the solutions of chlorinated lime were much less efficient in their disinfectant qualities; a solution containing 0.250 per cent of available chlorine requiring not less than 10 minutes to destroy staphylococcus pyogenes aureus and 35 minutes to kill anthrax spores.

In seeking an explanation of this marked difference in action between solutions of electrolyzed sea water and those of bleaching powder, I think that we must take into consideration the difference in the comparative bleaching action of these two solutions. Electrozone bleaches instantly; solutions of chlorinated lime, on the contrary, bleach slowly. In other words, the chlorine content of electrozone would seem to exist as a very unstable hypochlorite, or as free chlorine, which would account not only for its prompt bleaching action but also for the instability of this fluid. On the other hand, calcium hypochlorite is a more stable compound and gives off its chlorine slowly.

If, however, to the solutions of chlorinated lime there is added a small quantity of acid, such as dilute hydrochloric acid, so as to set free its chlorine and bring the latter into solution, while still preserving the alkalinity of the fluid, then we find that its bleaching effect is just as prompt as solutions of electrozone. Not only this, but its germicidal action is just as effective as electrozone having the same chlorine content.

The following tables will serve to confirm this statement:

TABLE XVI.

[Solution of chlorinated lime containing 0.100 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−
Typhoid bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XVII.

[Solution of chlorinated lime containing 0.150 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	+	+	+	−	−	−	−	−	−
Typhoid bacillus	+	−	−	−	−	−	−	−	−
Colon bacillus	+	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	−	−	−	−	−	−	−

TABLE XVIII.

[Solution of chlorinated lime containing 0.250 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.					
	1.	3.	5.	7.	10.	15.
S. pyogenes aureus	−	−	−	−	−	−
Bacillus icteroides	−	−	−	−	−	−
Anthrax spores	+	+	+	−	−	−

It will be seen, therefore, that chloride of lime to which hydrochloric acid has been added in the proportion of 40 parts by weight of the acid to 100 parts of lime, has been rendered, by the liberation of its chlorine, as effective in disinfectant qualities as electrozone. As care was taken to preserve the alkalinity of the solution, its germicidal action could not be attributed in any respect to free hydrochloric acid, but only to the chlorine remaining in solution as free chlorine.

Since chloride of lime and hydrochloric acid are agents that can be readily procured in large quantities and easily stored for use, it does not seem inappropriate to compare the cost of this disinfectant with the cost of electrozone. The latter preparation, I was informed by Colonel Black, was manufactured at a cost of 1.2 mills per gallon; and that to manufacture an electrozone of 0.250 per cent chlorine strength would cost about 2.6 to 2.8 mills per gallon.

It must be remembered that in making this estimate no account has been taken of the original cost of the plant, amounting to $75,000, nor of the interest on this sum ($4,500 per annum), nor of the depreciation of the plant, generally computed at 10 per cent per annum. Only the actual daily operating expenses ($37 per day) have been considered.

It is believed that the following calculations will closely approximate the relative cost of chlorinated lime and electrozone as disinfectants: To 1 pound of chloride of lime (7,000 grains), 3 cents; 1 pound of hydrochloric acid, 3½ cents. Seven thousand grains of chloride of lime, containing 35 per cent, or 2,450 grains of available chlorine, would make 16.78 gallons of a disinfectant, having a strength of 0.250 per cent, or 146 grains of chlorine per gallon. Deducting 1.78 gallons as loss of chlorine in making the preparation, we have: To 15 gallons of disinfectant, 1 pound of lime, 3 cents; 15 gallons of disinfectant, one-half pound of hydrochloric acid, 1.75 cents; total, 4.75 cents; or at a cost of 3.17 mills per gallon, or for 24,000 gallons, a cost of $76.08 per diem.

Since July 1, 1899, to March 31, 1900—234 working days—the total expenditure would have been $17,802 for sufficient chloride of lime and hydrochloric acid to have supplied a disinfectant having 146 grains of available chlorine per gallon.

On the other hand, we have the following:

Plant	$75,000
Interest at 6 per cent for 9 months	3,375
Daily expenses, $37 for 234 working days	8,658
	87,033

as the cost of supplying daily for 234 working days 24,000 gallons of electrozone, having no particular standard of strength as regards available chlorine, but certainly of a less strength (see Table I) than 0.150 per cent.

It seems fair to conclude, therefore, that had the sanitary authorities of Havana resorted to chloride of lime as the disinfectant instead of electrozone, the work of disinfection would have been more thoroughly carried out and the insular funds would have been richer by $69,231.

In carrying out the experimental part of this report I desire to state that I have received valuable aid from Acting Asst. Surgs. A. Agramonte, Jesse Lazear, and James Carroll, United States Army.

THE DEPARTMENT OF PORTO RICO.

HEALTH OF THE TROOPS.

In this department, with a mean strength of 5,693 regulars and volunteers during the year 1898, the admissions to sick report were equivalent to 2,574.21 per thousand of strength, and the death rate from all causes to 48.48 per thousand. Injuries contributed only 126.82 to the admission rate and 2.46 to the death rate, while gunshot injuries gave only 9.48 and 1.58, respectively. Malarial infections and diarrheal diseases contributed equally to the large rate of admission, the one 772.35 and the other 767.61 per thousand of strength, with mortality rates of 3.86 and 1.41 per thousand. Typhoid fever was the important factor as regards both prevalence and mortality, for 1,678 admissions with 197 deaths gave the respective rates of 294.74 and 34.60 per thousand of strength. Seven cases of smallpox with 2 deaths were reported during the year.

During the year 1899, with a mean strength of 3,727 regulars and volunteers, the admissions to sick report were equivalent to 2,522.40 per thousand strength, but the character of the cases were so much lighter than those of the preceding year that the death rate fell from 48.48 to 11.27 per thousand of strength. Injuries contributed 266.43 to the admission rate and 2.15 to the death rate, while gunshot injuries gave only 5.37 and 0.54, respectively. Diarrheal diseases added 542.80 to the admission rate, but gave only 2.68 to the death rate. Typhoid fever increased the death rate by 2.68, but gave only 15.03 to the admission rate, as compared with the excessive rates 34.60 and 294.74 of the previous year. Malarial infections added 458.84 to the admission rate, but no case proved fatal. There were 286.29 admissions for venereal disease per thousand men present during the year, with 25 men discharged for disability, equaling a loss of 5.63 men per thousand of strength. Seven cases of smallpox, none fatal, were reported during the year.

SEASONAL PREVALENCE OF DISEASE.

In Porto Rico in 1899 the mean monthly rate of admission to sick report for disease was 188 per thousand of strength. The minimum rate, 145.62, was recorded in February, the maximum, 270.69, in April. The rates continued above the mean in May, June, and July. During the other months they were about or below the mean. The excess of cases in April was due to alcoholism and venereal diseases.

The mean monthly death rate was 0.76 per thousand of strength. During April, May, June, July, August, and October the rates were above this figure, the maximum, 1.41, in August. No death occurred in the command in March. The small number of men constituting the army of occupation deprives these rates of value as indices of climatic influences. They are given in the following table:

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	10	1.60	2	0.32	12	1.77	2	0.30	4	0.79	.....	....
Malarial infections	314	50.22	.....	....	249	36.81	.....	....	153	30.28	.....	....
Undetermined fevers	5	80	.....	....	4	.59	.....	....	7	1.39	.....	....
Rheumatic affections	57	9.12	.....	....	36	5.32	.....	....	39	7.72	.....	....
Consumption	3	.48	.....	....	.....	....	1	.15	3	.59	.....	....
All venereal diseases	145	23.19	.....	....	120	17.74	.....	....	143	28.30	.....	....
Alcoholism and direct results	29	4.64	.....	....	19	2.81	.....	....	16	3.17	.....	....
Diarrheal diseases	304	48.62	1	.16	223	32.97	2	.30	162	32.06	1	0.20
Pneumonia	.....	....	.....	....	1	.15	.....	....	1	.20	.....	....
Total respiratory	47	7.52	.....	....	55	8.13	.....	....	31	6.13	.....	....
All diseases	1,190	190.31	4	.64	985	145.62	5	.74	879	173.96	3	.59

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	1	0.35	.....	....	9	2.55	.....	....	2	0.64	1	0.32
Malarial infections	120	42.09	.....	....	82	23.24	.....	....	134	42.64	.....	....
Undetermined fevers	10	3.51	.....	....	7	1.98	.....	....	7	2.23	.....	....
Rheumatic affections	30	10.52	.....	....	20	5.67	.....	....	17	5.41	.....	....
Consumption	.....	....	1	0.35	2	.57	.....	....	2	.64	1	.32
All venereal diseases	108	37.87	.....	....	94	26.64	.....	....	76	24.18	.....	....
Alcoholism and direct results	21	7.36	.....	....	19	5.39	.....	....	21	6.68	.....	....
Diarrheal diseases	124	43.48	1	.35	212	60.09	1	0.28	294	93.54	1	.32
Pneumonia	1	.35	.....	....	3	.85	1	.28	.....	....	.....	....
Total respiratory	27	9.46	.....	....	36	10.20	1	.28	24	7.63	.....	....
All diseases	772	270.69	4	1.40	707	200.40	3	.85	826	262.81	4	1.27

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	9	3.13	3	1.04	1	0.35	1	0.35	1	0.35	.....	.....
Malarial infections	144	50.02	.....	.....	109	37.79	.....	.....	54	18.76	.....	.....
Undetermined fevers	1	.35	.....	.....	1	.35	.....	.....	.....	.....	.....	.....
Rheumatic affections	15	5.21	.....	.....	25	8.67	.....	.....	25	8.68	.....	.....
Consumption	.....	.....	.....	.....	2	.69	.....	.....	2	.69	.....	.....
All venereal diseases	80	27.79	.....	.....	65	22.54	.....	.....	49	17.02	.....	.....
Alcoholism and direct results	11	3.82	.....	.....	10	3.47	.....	.....	7	2.43	.....	.....
Diarrheal diseases	152	52.80	1	.35	107	37.10	.....	.....	128	44.46	.....	.....
Pneumonia	.....	.....	.....	.....	1	.35	.....	.....	1	.35	.....	.....
Total respiratory	17	5.90	.....	.....	20	6.93	.....	.....	12	4.17	.....	.....
All diseases	648	225.08	4	1.39	509	176.49	2	.69	434	150.75	.....	.....

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	3	1.05	.....	.....	3	1.07	.....	.....	1	0.35	1	0.35
Malarial infections	95	33.40	.....	.....	147	52.33	.....	.....	108	38.09	.....	.....
Undetermined fevers	1	.35	.....	.....	2	.71	.....	.....	.....	.....	.....	.....
Rheumatic affections	10	3.51	.....	.....	23	8.18	.....	.....	13	4.58	.....	.....
Consumption	1	.35	.....	.....	2	.71	.....	.....	2	.71	.....	.....
All venereal diseases	65	22.85	.....	.....	51	18.16	.....	.....	71	25.04	.....	.....
Alcoholism and direct results	7	2.46	.....	.....	11	3.92	.....	.....	13	4.58	.....	.....
Diarrheal diseases	121	42.55	2	0.70	95	33.82	.....	.....	101	35.62	.....	.....
Pneumonia	.....	.....	.....	.....	1	.36	.....	.....	1	.35	.....	.....
Total respiratory	10	3.51	.....	.....	17	6.05	.....	.....	17	5.99	.....	.....
All diseases	494	173.70	4	1.41	497	176.93	.....	.....	467	164.67	1	.35

THE HURRICANE OF AUGUST 8, 1899.

According to the report of the chief surgeon, the salient feature of the year in Porto Rico was the hurricane of August 8, 1899. Barracks and hospitals were destroyed or much damaged at most of the posts. Many men were injured, but fortunately only one man belonging to the Army lost his life as a result of the cyclone. At Cayey the military hospital was destroyed, but the patients had been removed twenty minutes before the fall of the building. At Mayaguez the hospital was unroofed and the walls so strained that their fall seemed imminent. At Humacoa the barracks were destroyed and one man was buried in the ruins, while one end of the hospital was blown down and several men were injured. At Lares the hospital building was unroofed.

The Santa Rosa Hospital for indigent sick in San Juan was so badly damaged as to give no protection to its inmates. Capt. George M. Wells, assistant surgeon, United States Army, commanding the general hospital in the city, immediately transferred the exposed patients to his hospital, where they were cared for until returned to their own establishment, September 5. Much suffering was relieved by the prompt action of this officer. Again, at Ponce, where the destruction of property and loss of life occasioned by the storm were excessive, a tent hospital of 125 beds was established by Lieut. B. K. Ashford, assistant surgeon, United States Army, for the shelter and treatment of the sick who would otherwise have been uncared for. Much relief was given by this extemporized hospital.

Following these prompt efforts for the relief of local sufferers from the hurricane came an organized system by which nearly 200,000 people were kept from starvation for several months, and the medical officers of the Army were the chief agents by which this work was accomplished. From September 16, 1899, to January 22, 1900, the average number of destitute people fed each day was reported as 182,195. The total cost of the relief work was something over a million dollars expended for food and transportation, with practically no expense for personnel.

MUNICIPAL SANITATION.

The duties of our Army medical officers in this department would have been light during the past year had they been restricted to the care of the sick and wounded of the Army and the supervision of sanitary conditions affecting their commands; but there was placed upon these officers the responsibility for the welfare of the whole civil population. All the troops were in garrison under conditions of peace, with improvements steadily going on as to quarters, drainage, water supplies, and other matters affecting their sanitary condition, so that in June, 1900, the sick list at San Juan comprised only 4.5 per cent of the command; at Ponce, 2.6 per cent; at Mayaguez, 5.2, and at Cayey, 3.7, these being four of the largest posts in the department. But the sanitary supervision of the towns and districts in which the military posts were established was imposed upon these medical officers, who accepted their new and unusual duties with cheerfulness and devoted their energies to their successful fulfillment. A superior board of health for the island was constituted by General Orders, No. 91, headquarters Department of Porto Rico, June 29, 1899, to which all local boards of health were required to report. Maj. John Van R. Hoff, surgeon, United States Army, chief surgeon of the department, was appointed president of the board, and under his able and energetic management a modern sanitary code was given to the island. The duties of this board were announced in General Orders, No. 102, headquarters of the department, July 18, 1899, as follows:

> It shall be the duty of the superior board of health:
>
> 1. To have general supervision of all the interests of the public health of the island, and to especially study its vital statistics.
>
> II. To make sanitary investigations and inquiries respecting the causes of disease, and especially of epidemic diseases, including those of domestic animals, the sources of mortality, and the effects of localities, employments, condition, habits, food, beverages, and medicine on the health of the people.
>
> III. To disseminate information upon these and similar subjects among the people.
>
> IV. To institute sanitary inspections of all public institutions or places throughout the island.
>
> V. To consider and report to the governor upon the plans and specifications for all new water supplies, drainage, sewerage plants, and public institutions of all kinds, or for alterations in such public works or institutions. Copies of such plans and specifications will be filed in the office of the board.
>
> VI. To suggest amendments to the sanitary laws of the island and to have power to enforce such regulations as will tend to limit the progress of epidemic diseases.
>
> VII. To have power and authority to order nuisances or the causes of any special diseases or mortality to be abated and removed, and to enforce such interior quarantine regulations as said board shall direct in cities, municipalities, districts, or places where there are no local boards of health, or in case the sanitary laws or regulations should be inoperative in places where boards of health or health officers exist. Any person who shall fail to obey or shall violate such order shall, upon conviction, be sentenced to pay a fine of not more than $100 or be imprisoned for not more than sixty days, at the discretion of the court.
>
> VIII. To have general supervision of the insular system of registration of births, marriages, and deaths, and of prevalent diseases, and to insure the faithful recording of the same; also to prepare the necessary methods, forms, and blanks for obtaining and preserving such statistics.

IX. To prepare regulations governing the admittance of persons to the practice of medicine and surgery, pharmacy, dentistry, midwifery, embalming, and undertaking, and to enforce such regulations as are adopted by the government of the island.

X. To inquire into and report upon violations of laws governing the purity and wholesomeness of foods, drinks, drugs, and medicines. To submit, through the governor of the island, regulations to control offensive and dangerous occupations, and to report upon and make recommendations regarding any special sources of danger to life or person.

XI. To require all health officers and health boards throughout the island to forward to the superior board copies of all their reports and publications, and such other sanitary information as it may request. To require reports and information concerning such matters or particulars, in respect to which it may, in its opinion, need information for the proper discharge of its duties, from all public dispensaries, hospitals, asylums, infirmaries, prisons, penitentiaries, schools, and from the managers, principals, and officers thereof, and from all other public institutions, their officers and managers, and from the proprietors, managers, lessees, and occupants of all places of public resort throughout the island.

XII. To from time to time engage suitable persons to render sanitary service, or to make or supervise practical and scientific investigations and examinations requiring expert skill, and to prepare plans and reports relating thereto. This regulation must not be considered as authorizing any expenditure beyond the sum specifically alloted to the board for such purposes in the annual budget. When the cost of such investigations exceeds the allotment, special authority for the expenditure must be obtained from the governor of the island.

XIII. To make a written report to the governor on or before June 30 of each year, covering the general sanitary conditions of Porto Rico, the work of the officers and agents of the board, and a detailed statement by the treasurer of all moneys received and disbursed during the year. To submit special reports from time to time, as the occasion may demand.

XIV. To especially supervise subjects directly relating to public health, as follows:

1. Public water supplies.
2. Markets, bakeries, groceries, and milk depots.
3. The purity and wholesomeness of all foods, drinks, liquors, drugs, and medicines.
4. Public institutions, schools, asylums, jails, hospitals, dispensaries, barracks, court rooms, theaters, etc.
5. Tenement houses.
6. Vital statistics, marriages, births, deaths.
7. Licensing and registration of physicians and surgeons, dentists, pharmacists, midwives, undertakers, etc.
8. Plumbing and registration of plumbers.
9. Sewering.
10. Street cleaning.
11. Privies, water-closets, cesspools, etc.
12. Nuisances.
13. Slaughterhouses, stables, yards.
14. Contagious and infectious diseases.
15. Trades, factories, and industries offensive or injurious to the public health.
16. Undertaking and cemeteries.
17. Disinfection.
18. Licenses and permits.
19. Vaccination and the production of vaccine virus.
20. Diseases of domestic animals communicable to man.
21. Interior quarantine.
22. Poisons, explosives, and special sources of danger to life and person.
23. Sanitary supervision of travel and traffic.

XV. To institute prosecutions for violations of the provisions of this order in the nearest local court or in the United States provisional court, as the governor may direct.

By command of Brigadier-General Davis:

W. P. HALL, *Adjutant-General.*

At the time of our occupation of the island the prevalence of smallpox was so general that quarantine had been declared by the neighboring islands against the seaports. The disease existed in every direction, and was a constant menace to the people and a detriment to heir material interests. A general vaccination of the whole population was systematically carried into effect, the vaccine being provided rom a farm established at Coamo Springs. This extensive work was inished June 30, 1899; 742,062 vaccinations and 116,955 revaccinations were recorded. The disease was suppressed. No death from smallpox has been reported in the island for the past eight months. Again, while much of the pernicious anæmia which is so prevalent and fatal among the native population is certainly due to an impoverished diet, it has been shown by Lieut. B. K. Ashford, assistant surgeon, United States Army, that a great deal of the prostrating diarrhea and progressive emaciation, which has usually a fatal ending, is due to the irritating presence in the intestines of a number of minute worms (ankylostoma duodenalis), which can be easily got rid of by appropriate medication. (See page 274.) This disease has been extremely fatal, but its ravages will now be controlled under the supervision of local boards of health. These boards, acting under the instructions of the supreme board at San Juan, have done much to improve sanitary conditions and lessen sickness and mortality among this poverty-stricken people.

The superior board of health has prescribed an examination and license for all physicians, dentists, pharmacists, practicantes, midwives, and nurses now practicing in the island. It has appointed sanitary inspectors in every district, from whom regular reports of sanitary conditions are received. It has established a laboratory for the examination of food and drugs. It is collecting and collating the vital statistics of the country, and it has published several circulars or bulletins on the proper treatment of the prevalent diseases.

The work of the Medical Department of the Army in the Department of Porto Rico during the past year has added an exceedingly gratifying page to its history. The annual report of the chief surgeon, Maj. John Van R. Hoff, surgeon, United States Army, dated July 24, 1900, is herewith submitted:

> The salient feature of the year in Porto Rico was the hurricane of San Ciriaco, which occurred August 8, 1899, and the history of which is known to the world. Fortunately for the troops, but one of the 2,750, more or less, reported to have died as the result of that cyclone belonged to the Army. This is indeed remarkable when the widespread destruction, involving barracks, hospitals, and quarters, is considered. At Humacao the cavalry barracks were crushed to the earth, and beneath them Private Harry J. Barker, Troop C, Fifth Cavalry, lost his life. At Cayey the barracks and hospital were literally blown off the earth, while at Aibonito nothing but shapeless ruins marked the spot where shortly before stood apparently substantial stone structures. At Mayaguez the hospital was so wrecked and shattered that its immediate abandonment was found necessary, and at almost all other stations more or less damage was suffered.
>
> The following report from Dr. H. A. Eberle, post surgeon at Cayey, written on the very day of the hurricane, gives a startling glimpse of the then occurring conditions:
>
> "I have the honor to report the complete destruction of the post hospital at Cayey, Porto Rico, at half past 6 this morning. The sheet iron roofing of the west end of the hospital was carried away, and, fearing that the whole structure would go, I removed patients, three in number, to my house. It was a fortunate move, for in twenty minutes thereafter the entire roof was carried away, the walls staggered, and in a few minutes fell on the floor of the hospital, burying the beds, bedding, tables, medicines, books, reports, linen, blankets—in fact, everything that the hospital contained. Several accidents happened to the men—severe cuts and broken bones. All the wounded men are in my rooms and are being cared for. Our new supplies arrived last night and were stored in the basement of the building now used as a kitchen. The walls have fallen over these supplies, and we are not able to predict their condition.

"Until a complete examination is made of what can be saved from the débris I will not ask for any supplies.

"The town has suffered incalculably, as there is not a house in the city which is not totally or seriously damaged.

"Of course the barracks are ruined and the stables down, but Captain Foster is improvising quarters for the best comfort of the troops.

"The storm is still raging at this hour, 5 p. m."

On the 10th the foregoing report was supplemented, as follows:

"I have the honor to state that since yesterday morning we have been providing quarters for the sick and wounded, purchasing supplies and rations, and gathering from the wrecked hospital some needful medicines.

"Sufficient cots and mattresses have been secured for present need. The bed linen and pillows were soaked and much damaged. Washerwomen were employed to-day to clean the linen. The captain provided a room in the stable suitable for six cots.

"Our books are all water-soaked and unfit for any kind of use whatever. We need a complete outfit of blank books, and I have no information slips on which to make requisition.

"The medical and surgical chests lie under tons of rock and mortar, and are supposed to be crushed, water-soaked, and unfit for service.

"The health of the troop is good, and seven only figure on our improvised medical register.

"A requisition for medical supplies will follow as soon as possible, and only the most needful articles will be asked for, as our room is too small to store many.

"There have been 34 bodies brought into the cemetery for burial, 28 of whom died from starvation, 6 killed from falling timbers.

"There is much destitution here and food is greatly more needed than clothing. Mrs. Eberle and daughters have employed their time in clothing and feeding a few of the most destitute.

"The shacks of the poor were totally ruined and they are absolutely without shelter. Unorganized contributions, if speedily sent, would do a world of good and perhaps save many from starvation."

On August 9 the surgeon at Mayaguez reported as follows:

"I have the honor to inform you that on August 8, 1899, the post hospital at Mayaguez was damaged to such an extent by a tornado that it was necessary to remove the patients to the barracks during the height of the storm. In each of the wards the walls were cracked and injured to such a degree that they could be seen swaying back and forth with the wind. One partition, that between the squad room and the Hospital Corps dining room, fell and several members of the corps narrowly escaped serious injury. Parts of the other walls have since fallen and considerable damage has been done to the medical property. The veranda in the inner court was completely torn away on the east and south sides, and damaged on the two other sides. The first damage done was the blowing away of a portion of the tin roofing from the veranda. This occurred about 10 a. m. and from that time the wind increased in severity until 11.30 a. m., when the partition in the squad room fell. About this time the other walls began to crack and the patients were hurried over to a room on the first floor of the barracks, as it seemed that the whole building would be destroyed. The hospital building is damaged in such a manner that after an inspection by the commanding officer this morning it was considered unsafe for occupancy until very extensive repairs have been made. The patients are for the time being comfortably situated in the barracks, and a building has been rented in the city to be used as a hospital. As soon as it is properly policed and arranged the patients will be moved there."

On the same date the surgeon at Humacao reported:

"I have the honor to inform you that during the tornado three men of Troop C, Fifth Cavalry, were seriously wounded. Harry J. Barker, internal injuries, abdominal, serious; Joseph Foutaine, dislocation of hip (reduced under ether) and two scalp wounds, severe; Hugh J. Clark, fracture (comminuted), both bones left forearm, scalp and face wounds, contusion right hip and thigh, severe. All three received injuries by being buried under fallen brick wall. No others belonging to this command have been badly injured; several sprained ankles, wounds, contusions, etc., but none severe. Officers are all well. The hospital roof is in bad condition, but has been patched until it is now the best in town except the jail. One end of building was blown out, but has been since boarded up. We are, compared to others, very well off. I have not lost medicines or dressings to any extent, and supply has been sufficient to meet all demands so far."

On August 12 the surgeon at Lares wrote:

"I have the honor to report that the recent storm which visited Porto Rico caused considerable damage to this post. There were four men sick in this hospital at the time, none serious. The storm completely unroofed the building, admitting the rain in torrents; but one room which had been fitted up for the operating room was fairly dry and the sick occupied that. Acting Steward McCleery and the three privates of the Hospital Corps at this post all conducted themselves in a creditable manner, looking out for the comfort of the patients and protecting as well as they could the property of the Medical Department. The blankets and bedding were kept dry, as were many perishable articles, but some loss has been sustained, just how much I am unprepared to state at present.

"All telegraphic and mail communication is cut off for the time being, mail being received only from Aguadilla.

"The hospital, Ponce, suffered slight damage to the walls, and that at San Juan had the windmill destroyed."

From the foregoing it will be seen that considering the extent of the damage, the loss of life was remarkably small.

Fortunate as we were, the hurricane had a distinctly deleterious effect upon the command, which manifested itself throughout all departments, and postponed the attainment of the highest degree of efficiency, both sanitary and otherwise, which the beginning of the fiscal year promised. For the most part we have been Samaritans, not soldiers, ministering to the wants of a starving population, and struggling to keep alive those who, in accordance with the Draconian laws of nature, should have made room for a fitter people. But who can say that this was not a higher duty than the perfecting of details which make up a military machine.

The details lack polish, but 100,000 people more are alive in Porto Rico to-day than would have been had not the Army turned itself into a purveyor of beans, rice, codfish, and old clothes.

However, the Medical Department has not "marked time," for there has been a distinct lessening in the number of sick and dead, which is the true measure of its value. In July, 1899, the total sick equaled 8.4 per cent of strength, while in June, 1900, it was but 4.3 per cent. The daily average for the first six months of the year was 7.6 per cent, and for the second six months 4.7 per cent, the latter as against 6.4 per cent for the last six months of the fiscal year 1899. The total number of cases under treatment for the year was 7,758 and the average daily noneffectiveness from sickness was 210.

The total number of deaths was 33, being at the rate of 10.6 per thousand per annum. The causes of deaths were, killed by natives, 4; dysentery, 3; typhoid fever, 8; cerebro-spinal meningitis, 2; remittent fever, 1; septicænia, 1; pneumonia, 2; cardiac embolism, 1; rheumatic fever, 1; accidents, 3; suicide, 4; apoplexy, 1; gastro-enteritis, 1; heart failure, 1. Total 33.

The total number of discharges on surgeon's certificate, exclusive of those under paragraph 844, Army Regulations, was 72, and 28 recruits (Porto Rico) were discharged under this paragraph. The causes of discharge were: Tuberculosis, 11; venereal, 19; varicocele, 4; insanity, 8; epilepsy, 3; gonorrheal rheumatism, 1; hernia, 10; catarrh of stomach, 1; corns and sore feet, 1; recurrent appendicitis, 1; flat foot, 1; heart disease, 2; chronic arthritis, 2; chronic eczema, 2; injuries, 4; blindness 2.

Prevailing diseases.—June 30, 1900, there remained under treatment 151 cases, of which 7 were typhoid, 20 digestive, 48 venereal, and 21 malarial; from which it will be seen that the same diseases continue to preponderate, and in the same order. During the year there were under treatment 2,011 cases of digestive diseases, 1,480 cases of venereal diseases, and 1,235 cases of malarial diseases. Sixty cases of typhoid fever were treated during the year, of which number 8 died. Besides the foregoing the only infectious diseases reported were: Measles, 22 cases; dengue, 53; erysipelas, 3; and cerebro-spinal meningitis, 1, of which only the latter died. While digestive diseases still claim the largest share of total sickness, there has been a marked decrease in the rate per thousand, which is 649 against 916 last year. The reason for this is quite apparent, and the improvement would have been much more marked had the hurricane not occurred. The men had settled down to peace conditions and were living the usual comfortable garrison life—ample shelter, sufficient clothing, proper food. While the cyclone interfered to a certain extent with all of these, it destroyed the fruit, which may be considered an offset.

Venereal diseases still maintain their unenviable prominence, the annual rate being 478 per thousand, against 467 last year. It is interesting to observe that these diseases are quite as prevalent among the Porto Rico volunteers as among the regular troops, which supports the position taken in my last annual report, that the people here are syphilized.

Perhaps no more startling proof can be given of this than that deduced from the last census and published in Bulletin No. 2, as follows: "The persons over 45 years of age in Porto Rico were only 11.8 per cent of the entire population. This is in marked contrast to the United States, where persons over 45 were 17.2 per cent of the total population, and also to other countries. Thus in India this class was nearly 15 per cent and in Cuba 14.2 per cent of the total population."

To be sure, in spite of this, the population has steadily increased up to last year, when the death rate exceeded the reported birth rate. Perhaps sufficient was said on this subject in my last annual report, but this danger to home communities from returning soldiers is a constant threat which not only concerns us, but will reach even unto the third and fourth generation. The efforts to control prostitution have been noneffective because of the inefficiency of the means and the indifference of public opinion. If syphilization is so general here, why should the Porto Ricans interest themselves to prevent the United States soldier from becoming syphilized?

As was to be expected, the records show considerable improvement in malarial diseases—440 per thousand, against 509 last year. This will continue to improve, as the hurricane undoubtedly indirectly increased the number of cases. It may be well to note the fact that the Porto Rico volunteers show proportionately a much larger number of cases than the regular troops. In fact, their sick rate is higher all along the line, except at Cayey, where, in comparison with the former garrison, the present command has an excellent health record.

Up to the present time there has been no epidemic in Porto Rico. Immediately following the hurricane, dysentery occurred extensively among the people, especially in the uplands, and a large number died, but this did not extend to the troops.

The conditions now obtaining here, which accentuate the hunger, filth, misery, and want which are the common heritage of 800,000 Porto Ricans, are ripe for an epidemic, needing only the match to start the conflagration. To prepare for all contingencies, sites for camps of refuge for all garrisons have been designated and the post commanders directed to make the necessary arrangements for immediate evacuation. The following circular was issued from this office May 21, 1900:

"In view of the approach of the sickly season and the possibility of an epidemic occurring which might require the immediate evacuation of your post, you will at once assemble all the material necessary for the establishment of a field hospital adequate to the requirements of your command, and keep it always ready for immediate mobilization. You will predetermine what men of your detachment will be attached to this hospital, what duties they will perform, what clothing they will take, how they and the field hospital will be transported—in fact, everything necessary—and will make full memorandum, so that should an order to move reach you there will be no confusion and nothing forgotten.

"In order to assure yourself that everything is provided and to enable your men to become acquainted with the material of the hospital, the pitching of tents, loading and unloading of the material, etc., you will from time to time cause your field hospital to be pitched and all the material pertaining to it placed therein exactly as it would be in case of actual use. Should you lack anything pertaining to such a hospital, as laid down in Manual, Medical Department, or elsewhere, you will at once make requisition on the proper department for it, and if it can not be obtained you will report the fact to this office."

The question of a permanent infectious-disease hospital at San Juan is still subjudice, and fortunately up to the present time there has been no occasion for one. With the reduction of the garrison the building designed and constructed by the Spaniards as a yellow-fever hospital, but used by us as barracks, could be put to the use for which intended should the necessity demand. In the meantime, to meet any ordinary emergency the following recommendation was submitted, June 6, 1900:

"In this climate an infectious-disease hospital is quite likely to be required at any time, and can not be improvised in a moment. Its requirements are efficiency, isolation, and convenience. The location of the present city hospital is ideal for this purpose, but not available for the moment. The most practicable suggestion as a temporary expedient is to use Santa Elena Battery as an infectious-disease hospital for the command, turning out the Municipal Board of Health Hospital and assigning to it a location at Puerta de Tierra for an infectious-disease hospital for the civil population. This would demand no construction, as the present building would be sufficient for storage purposes, and floored and raftered tents would furnish shelter for the sick. It is so recommended."

As bearing upon the sanitary conditions, it may be recalled that the only changes in the constitution of the command during the year was occasioned by the organization of the Second Battalion, Porto Rico Regiment, United States Volunteer Infantry, numbering 450 officers and men, and the departure of the first squadron of the Fifth United States Cavalry, March 24, 1900. The strength of the command on June 30, ultimo, was 3,096, against 3,142 on June 30, 1899. The monthly sanitary reports, several of which have been most interesting and exhaustive, and the inspection by the chief surgeon lead to the conclusion that there has been considerable improvement in the immediate sanitary surroundings of the troops, but I am persuaded that there is yet room for improvement. A study of the percentages of sickness at the four largest posts is interesting, but not entirely conclusive. As frequently remarked, the sick report of a command, under average circumstances, depends in large measure upon the zeal and experience of the medical officer.

At the beginning of the month there were remaining under treatment at San Juan, 4.5 per cent; at Ponce, 2.6 per cent; at Mayaguez, 5.2 per cent, and at Cayey, 3.7 per cent (Porto Rico Battalion in camp).

The headquarters and the Third Squadron, Fifth Cavalry, and the First Battalion, Eleventh Infantry, are at this writing under orders to proceed to the United States, together with 2 medical officers, 3 acting assistant surgeons, 5 acting hospital stewards, and 25 privates, hospital corps; 1 signal officer, 6 noncommissioned officers, and 9 privates of the Signal Corps.

At the beginning of July, 1899, there were remaining sick from the previous year, at San Juan, 10 per cent; at Ponce, 6.8 per cent; at Mayaguez, 8 per cent, and at Cayey, 11.3 per cent (M Troop, Fifth Cavalry, in barracks).

Attention is invited to the interesting report of First Lieut. B. K. Ashford, Medical Department, United States Army, some time surgeon at Ponce, for the month of September, 1899, in which reasons are given for the abolition of the post. Certainly the present very satisfactory condition of the health of the command would be an argument against such as a sanitary necessity. But, as a practical fact, at this moment the community of Ponce is living over a powder mill. There is no epidemic, except of poverty and starvation, but the death rate, which last week was at the ratio of 123 per thousand per annum, would indicate a condition of affairs ripe for anything. While the annual rate for 1899, 42 per thousand, is not evidence of a health resort, the rate for the entire island was 41.

The War Department has a very valuable plant at Ponce, which could doubtless be disposed of for more than enough to construct a modern and perfectly appointed suburban military post.

A considerable amount of constructional work has been done on barracks and hospitals during the year, much of it entailed by the hurricane, and it may be stated that all of the permanent posts are in fairly good condition.

Attention is invited to the series of interesting sanitary reports from the surgeon of the post of San Juan, covering the sanitary conditions and requirements of that station. So far as observable, the least comfortable, relatively, of the military people are the officers and noncommissioned staff. They should at least be made as comfortable here as at home.

The drainage and sewerage remains about the same as last year, when it was stated that such was "practically nonexistent." The barracks at San Juan alone have sewer connections.

The water supply is usually adequate in quantity, but the quality is always suspicious. Every barrack should be supplied with some efficient and convenient means of sterilizing water, for all the water in Porto Rico must be regarded as bad. In this connection attention is invited to the reports of First Lieutenants Ashford and Russel, Medical Department, United States Army, on intestinal parasites in Porto Rico, the logical deduction from which is that a very large percentage of the natives of the island entertain the most objectionable of these entozoa. Considering their habits, this is not surprising, nor is it surprising that drinking water here must be sterilized to be safe.

Ice is very essential to our people in the Tropics. An excellent plant has finally been established in San Juan which produces 3 tons of ice and 500 gallons of distilled water daily. The plant at Ponce is not efficient, and is very expensive in connection with the supply of water to the hospital there. As ice is now readily obtainable from commercial sources in Ponce, I have recommended that the ice machine there be moved to Cayey, provided the latter is to become a permanent station.

The monthly reports indicate that the food is satisfactory in all respects. I have not heard of any post gardens being started, but the advantages of such are apparent. The practical truth of the matter is, we do not yet feel at home here and are thinking much more of getting away than putting our establishment in order for a long and comfortable sojourn.

Clothing is reported in ample supply, but objection is made to the "war" khaki, which is bedecked with various colors and when washed becomes all colors. It has been suggested that the several thousand suits of this in stock might be distributed to the natives here, who now wear only their skins. But this is hardly a satisfactory disposition of a United States Army uniform.

The habits of the men as to intoxication are reported as improving. Court-martial has eliminated the worst drunkards who managed to elude the vigilance of the recruiting officer; but rum is so universal and cheap and the demands that the Tropics make upon northern vitality are so pressing that a stimulant of some kind is necessary and the most convenient one will usually be taken. Two hundred and twenty-eight cases of diseases of the nervous system occurred last year.

I wish I might be able to say that these records indicate a decline in venery, but unfortunately such is not the case, for of all diseases venereal alone shows an absolute increase, a ratio of 506 per thousand. Some of the worst of these cases were discharged on surgeon's certificate of disability, with the recommendation from this office that the discharge be made "without honor." Several reasons led us to this recommendation. (1) It was believed necessary to take stringent measures to control the spread of a disease which was not only threatening the efficiency of the service, but was threatening to involve our people at home to-day and far into the future. (2) It was believed that some were so misguided that they actually sought the disease as a means by which they might obtain discharge from service which had become irksome to them. (3) It was thought that the Government had some equity in the matter and should not be called upon to lose any more of its investment in the particular individual than was absolutely necessary. These views were not accepted, as shown by the following correspondence:

WAR DEPARTMENT,
Washington, D. C., May 26, 1900.

The COMMANDING GENERAL, DEPARTMENT OF PORTO RICO,
San Juan, P. R.

SIR: By direction of the Assistant Secretary of War, I have the honor to communicate to you herewith the opinion of the Surgeon-General of the Army, dated May 12, 1900, which has been concurred in by the Assistant Secretary of War:

"In my opinion discharge for venereal diseases should not be a discharge 'without honor' and there should be no objection to the reenlistment of a man discharged for such disease, if he has entirely recovered. If it is considered in the interest of the service to discharge a man who has contracted venereal disease rather than to retain him in service until he has recovered under proper treatment, he should be given the usual discharge upon certificate of disability, which certificate should set forth the fact that the disease was not contracted in the line of duty, but there is not authority for indorsing the nature of the disease upon the soldier's discharge.

"If enlisted men are discharged 'without honor' for contracting venereal diseases, officers should be dismissed the service if they meet with a like misfortune."

Very respectfully,

THOMAS WARD,
Acting Assistant Adjutant-General.

The present condition of the permanent hospitals is as follows:

The hospital at San Juan, which ceased to be a general hospital December 31, 1899, is in excellent condition. Expended in repairs during the year, alterations and plumbing, $2,884.10. The capacity of this building is far beyond present and prospective demands. To concentrate the work and material of the medical depot, it is proposed to turn over the present hospital corps squad room (6,000 square feet) to be used by the supply depot. The considerable reduction of the hospital corps detachment on duty at this hospital will permit this use of the space, and thus allow both the hospital and depot to be brought, if necessary, under the control of one officer.

The hospital at Ponce is in admirable condition and is, as it always has been, a credit to the department. Expended in repairs during the year $730.16.

The hospital at Mayaguez, which, as above stated, was wrecked by the hurricane, is now undergoing repairs, at a cost of $5,000. During the intervening period a very comfortable private building has been used, at a rental of $75 monthly. The delay in the repair of the hospital was due to various causes, chief among which was the determination of the title to the property.

The hospital at Aibonito has been repaired on the old lines, at a cost of $550. It is comfortable and adequate to any demand likely to be made upon it.

No permanent construction has yet been made at Cayey, but an excellent temporary hospital has been established in half of the barracks building (for dispensary, wards, etc.). A frame building was constructed on the foundation of the old hospital, to be used for messroom, kitchen, and storeroom, at a cost of $1,783.04.

Very satisfactory temporary hospitals in private buildings are maintained at Humacao, Aguadilla, and Adjuntas, the last named the least so.

Four temporary hospitals, Arecibo, Lares, Manati, and San German, have been abandoned.

Furniture, appliances, and supplies of all kinds are ample.

The personnel of the medical department at the date of this report consists of—

	Medical officers, U. S. A.	Medical officers, U. S. V.	Acting assistant surgeons.	Hospital stewards, U. S. A.	Hospital stewards, Porto Rico regiment, volunteer infantry.	Acting hospital stewards, Hospital Corps, U. S. A.	Privates, Hospital Corps, U. S. A.	Contract nurses, female.
July 25, 1900:								
Present	7	2	10	4	2	15	81	....
Under orders	2	....	3	1	....	5	25	....
Remaining	5	2	7	3	2	10	56	....
Strength July 25, 1899	12	....	19	8	....	20	124	8

No contract (female) nurses have been on duty in the department this year (1900).

The reduction of the medical strength to little more than 3 per cent of the command is considered to be the lowest justifiable limit, though considerably in excess of the regulation allowance. I hope the time has come when the authorities will realize that the sanitary soldier is intended to meet just the circumstances that any other soldier should. He is not only for present conditions but future contingencies, and there should be about as many of him as those contingencies are likely to require. The present reduction was made to meet the emergency of foreign service.

The instruction during the year continued on the lines laid down in the circulars of December 28, 1898, which requires four hours weekly to be devoted to this purpose. The class standing is reported monthly in the return of the Hospital Corps, and the good result of the instruction is shown by the fact, as stated in a letter from the Surgeon-General's Office, that the proportion of acting hospital stewards was higher in this department than in any other.

The examinations are quite up to the standard of antebellum days.

Attention is respectfully invited to the report of the officer in charge of the medical supply depot, San Juan, hereto attached. A very large amount of property has been inspected and condemned. This is due to several causes: (1) A great deal of property was destroyed by the hurricane, and (2) a considerable amount of wornout property had accumulated and awaited the action of the inspector.

In spite of the vicissitudes of war and various other happenings in Porto Rico, there still remains on hand a large amount of field supplies, much of which has been in use. The supply officer has had such of this as was worth it put in order, but while it might be exceedingly useful here, I question whether it would be worth sending elsewhere. Many special requisitions have been received from the smaller posts, so many indeed that a circular was issued calling attention to paragraph 68, Manual Medical Department, 1899.

The supplies have been ample and adequate in all respects.

The demands made upon the medical department in relation to the civil work were quite commensurate with that of the rest of the military body in Porto Rico. Everywhere the requirements of a starving race thrust themselves upon us, and I am happy to say that everywhere my officers and men willingly accepted the added burden. On the day of the hurricane Captain Wells, at the height of the storm, went to the rescue of those caught in the wreck of the Santa Rosa Hospital, San Juan, and personally supervised their transfer to the military hospital. Lieutenant Ashford, at Ponce, opened his hospital to the homeless sick there, and as soon as possible after the storm erected a tent hospital which for months furnished everything necessary to the best care of hundreds of sick who otherwise must have gone without care. Lieutenant Russel, at Humacao, afterwards alcalde of that municipality, rendered signal service, as did Lieutenant Truby at Mayaguez, while Drs. Eberle, McConathy, Williams, and Cutliffe were unsparing of themselves in their efforts to relieve not only their own sick but those of the suffering communities about them.

The organization and general supervision of the relief work in Porto Rico fell to the writer and has been made the subject of an exhaustive report, but I can not fail to take advantage of this opportunity to invite the particular attention of the department commander to the very important part taken by all the medical personnel in the effort to keep 100,000 human beings alive.

The reestablishment of the general sanitary organization of the island, the formulating of regulations, the licensing of the medical personnel, the organizing of a chemical laboratory, vaccine station, etc., indeed all the functions of a State board of health, which had been in abeyance since before the invasion, added to the already heavy burdens of the medical department, but were made cheerfully and zealously.

The organization of the insular charity institutions and their supervision also fell to our share, until it seemed that in no day were there hours enough for the work.

In connection with these various undertakings I would invite special attention to the valuable services of the following-named gentlemen, who have not heretofore been mentioned in this report: Maj. P. R. Egan, surgeon, United States Army, who during most of the time the relief work was being carried on was secretary and disbursing officer, and who purchased much and distributed all of the medical supplies used in this work; Maj. George G. Groff, surgeon, United States Volunteers, who was secretary of the superior board of health, was largely instrumental in its organization, and Dr. Harold W. Cowper, acting assistant surgeon, who at different times was the secretary of both the superior board of health and the board of charities, Porto Rico, in both of which his services were marked by zeal and intelligence.

With the completion of this report my official connection of nearly two years with this department as its chief surgeon and of more than a year with the present department commander ceases. I may therefore be pardoned in expressing my appreciation of the unfailing support which he has extended to me and the kindly courtesy which has marked all our relations.

EXTRACT FROM THE REPORT OF MAJOR P. R. EAGAN, SURGEON, UNITED STATES ARMY, MEDICAL SUPPLY OFFICER, DEPARTMENT OF PORTO RICO.

Experience in a tropical clime has shown that the following articles should receive special attention in order to prevent their deterioration:

1. Chloral, potassa, and deliquescent salts should be placed in glass-stoppered bottles.
2. Articles of iron, such as garden trowels, gridirons, etc., should be galvanized.
3. Articles of tin, such as colanders, milk pails and buckets, pans (milk, dish, and waffle), Arnold sterilizers, etc., should be made of agate ware. Iron and tin ware is soon rusted through, and the life of such articles in this climate is very short.
4. All surgical instruments should be well protected by the application of a film of vaseline by the manufacturer. Case and thick paper alone are not sufficient protection here.
5. Saws, hand and butcher, and the contents of tool chests should be well protected by vaseline and wrapped in paper.
6. All medical books should be wrapped in thick manila paper, with the title outside. Two weeks here is sufficient time to mold the covers unless so protected.
7. Tourniquets, rubber, and Martin's bandages should be protected by talcum when placed in their packages.
8. No wax should be used to seal bottles of liquids; capping is cleaner and better.
9. The green soap in the surgical chests should be inclosed in a strong screw-capped vessel. At present it escapes and fouls everything in its compartment.

DISPOSAL OF EXCRETA.

In my last annual report is given the description of a trough system for the collection of the excreta of camps with an odorless excavating apparatus for their removal. This system was recommended by a board of medical officers to whom I referred the subject. Their report was forwarded to the Adjutant-General of the Army and the details of the subject were published in General Orders, No. 170, September 26, 1899. In their report the board stated that "methods of incineration of fæces have been and are being investigated, but our practical examination has not been sufficiently extensive to warrant us in recommending any of them." In a second report the board stated that it had been able to examine the practical operation of three crematories which had been erected for trial at Washington Barracks, D. C.

First. The combined camp crematory for excreta and garbage designed and submitted by Frederick P. Smith, C. E. This consists of a series of hoppers arranged in a circle about a central furnace. The materials to be destroyed are received on flat plates having such an incline that the liquid parts flow toward the central fire and are subjected to a constant drying. The solid parts are from time to time pushed toward the edge of the fire, and when dried can at any time be raked into the grate and burned. A large evaporating pan is placed above the fire for the reception of garbage, which, when dried sufficiently, is tilted into the fire and burned. Draft and ventilation are secured by a pipe having a height of about 40 feet. This crematory was reported to have accomplished all that its inventor claimed for it. Its weight, however, renders it unsuitable for troops on field service. A 14-hopper crematory for two companies would weigh 7,000 pounds.

Second. A crematory submitted by the Albany Sanitation Company, of Albany, N. Y. This consisted of a furnace and 7 closets. Each closet section is a cylindrical tube of one-fourth inch cast iron 20 inches in diameter, and weighing 150 pounds. Rising from each section is a cast-iron hopper, provided with suitable seat and cover. The separate closet sections are provided with flanges, by means of which the several sections are securely bolted together, thus forming a continuous iron tube, connected at one end with the furnace. Excreta are received into this hollow iron tube. A galvanized-iron pipe 14 inches in diameter is provided for the purpose of bringing a current of warm air from the furnace, and thence conducting it to the distal end of the excreta tube, from which point it is drawn over the surface of the excreta. This serves both for the purpose of drying the excreta and for the ventilation of the closet. A urinal is provided, from which the urine is conducted, by means of a 3-inch iron pipe, to a pit beneath the furnace, where it is subject to constant evaporation. The furnace is furnished with a smokestack 16 inches in diameter, rising to a height of about 35 feet.

This crematory accomplished in ventilation and freedom from odor all that was claimed for it by the Sanitation Company, but it failed to effect the thorough desiccation of the excreta preparatory to incineration. Moreover, the weight and unwieldiness of its sections render it unsuitable for portability.

Third. A crematory submitted by the International Household Garbage and Excrement Crematory Company, of Buffalo, N. Y. This consists of a steel jacket lined with asbestus within and provided with a sheet-iron covering without. The top and bottom of this jacket consist of cast iron. The excreta are received into a cast-iron pot, having a capacity of 7 gallons, and which revolves on a horizontal axle. A suitable grate, with ash pit, is provided beneath the pot. An opening of proper dimensions, with seat and cover, is provided in the cast-iron top of the jacket. Ventilation is brought about by means of a 6-inch stovepipe flue rising to a height of 12 feet. When desired to destroy the contents of the pot, the wooden seat and cover are removed, the opening closed with a galvanized-iron cover provided for that purpose, and a fire started on the grate below. The board found that the ventilation was not such as to remove all offensive odors when the cover was lifted and that during incineration pungent and disagreeable odors were evolved.

The closing paragraph of the report of the board is as follows:

> In the opinion of the board, none of those mentioned above meet all the conditions of troops in the field as well or as economically as the apparatus recommended by this board in its report of December 28, 1898. We believe that the apparatus therein described is much easier of construction, far more readily transportable, and capable of effecting the same results in an equally satisfactory manner as to the disposal of excreta. For large hospitals or permanent camps the Smith crematory, if intelligently managed, will suffice for the destruction of both excreta and garbage, and for such purposes we believe that it may be recommended.

Several of the Smith crematories were sent to Cuba for practical trial. They were used at Guanajay and Pinar del Rio. At neither of these places did they give satisfaction. Major Havard, chief surgeon of the division, August 23, 1900, urged the speedy substitution of some other system for the disposal of excreta and garbage at these two posts. The chief defect of the Smith crematory was an offensive odor, due to imperfect combustion. He believed that if this were remedied the system would be valuable.

FOOD.

The subsistence allowance of 40 cents per day has proved ample at all posts to give the sick and wounded the special diet which they require.

Since the occupation of Cuba, Porto Rico, and the Philippines by our troops much has been said and written on the desirability of altering the ration of the United States Army to suit it for the needs of the system in tropical climates. At first the claim was freely made that the ration should contain less meat, less fat, and more rice than under existing laws. This agitation subsided when volunteer medical officers came to understand that the diet of the soldier may be varied by the use of many articles that are not mentioned as parts of the daily ration; that with the commuted savings of the ration articles may be purchased from the Subsistence Department or from outside sources with which to vary the diet, and that, as stated by Major Havard in his report for the division of Cuba (see page 174), the diet of the soldier is what the company commander and his first sergeant and cook may choose to make it, the materials being amply provided by the official ration. Under present laws and regulations the soldier may have any variation of his diet within certain money value limits which his officers consider necessary for his well-being. His ration is fixed by law, but his diet depends on the intelligent supervision of company officers and the ability of company cooks.

Besides this, a further experience in the Philippines has shown that though it is undoubtedly true that while leading quiet lives men eat less in a tropical climate than in a temperate or cold climate, and particularly of meat or fatty substances, our soldiers during the active operations of last year have shown no marked tendency to lessen the quantity of fresh meat eaten. Exhausting labors and fatigues with corresponding wear and tear of the muscular system require a liberal meat issue, which the soldier uses with satisfaction and advantage. According to the chief surgeon Department of Northern Luzon, the fresh beef and mutton sent to the Philippines came as a rule from Australia, and was issued in excellent condition to the troops in the interior, hundred of miles from Manila.

During the active service of the troops in the Philippines a scarcity of fresh beef and potatoes was at one time reported from some of the commands, particularly from outlying posts in Nueva Vizcaya, which were reached with difficulty. With these exceptions and that of a recently received report from Maj. Jefferson R. Kean, surgeon, United States Volunteers, chief surgeon Department of Havana and Pinar del Rio, medical officers have expressed entire satisfaction with the present ration and the earnest efforts of the Subsistence Department o supply their commands.

Major Kean refers in his report to what he regards as certain shortcomings in the army ration, particularly as regards its use in a tropical country. He premises that a tropical dietary, as compared with one suited to a colder climate, should have less fat and more carbohydrates, less stimulating proteids in the form of meat, a greater variety of diet both of meats and of carbohydrates in the form of fresh vegetables and fruits, and, lastly, a fairly liberal supply of ice. His argument for the substitution of carbohydrates for fats is that the digestion is weakened in hot climates and the liver is inclined to torpidity, while ingested fats are prone to split up into butyric, caproic, and other irritating acids, which the diminished secretion of the liver is unable to neutralize. As intestinal digestion can not proceed in the presence of acidity, the condition known as biliousness is established, with putrefaction of the intestinal contents and the production of various harmful alkaloidal substances. A catarrhal inflammation of the bowel results, with diarrhea, which is at first of advantage in eliminating the harmful substances, but which under the continued irritation of unsuitable diet is liable to continue and become aggravated. As to a lessened use of meat, he cites the dietary customs of the inhabitants of hot climates, who get their proteids less from meat than from the leguminosæ. The appetite is lessened by long and continued heat and becomes capricious. It craves variety, especially in vegetables and fruits, and these he claims can not be had on the basis of our present ration. The need of ice to furnish a cool drinking water and to preserve the perishable constituents of the ration is regarded as obvious.

The ration fails in his opinion to provide for these requirements, for although there are several alternative issues authorized in Army Regulations, 1253, the choice of them does not seem to be with the soldier or his captain, and the company savings as now authorized on the fresh-beef and other issues do not suffice to purchase enough of fresh vegetables. He tabulates the savings made by 18 organizations, numbering 1,900 men, at Columbia Barracks, Cuba, from July 1 to December 31, 1899, as showing a per diem of only 1.8 cents per man.

To remedy these defects he suggests certain changes in the ration: That mutton and fish be issued each twice in ten days; that the issue of fresh meat in garrison be ordinarily 12 ounces, the commutation of the remaining 8 ounces of the 20-ounce ration to be paid in cash into the company, troop, hospital, or other mess fund; that commanders of departments, corps, or independent divisions or brigades be empowered, on the recommendation of the chief surgeon, to increase the issue of fresh meat not to exceed 20 ounces when necessary; that the vegetable component of the ration to be issued consist of rice, 2.4 ounces; frijoles, 2.4 ounces, or macaroni, 2 ounces, and fresh vegetables, in proper variety (purchased in the vicinity of the post when practicable), 16 ounces, and that ice, 32 ounces, be added to the ration. In our present ration potatoes are a daily issue, furnishing the bulk of the fresh vegetable allowance. These potatoes have to be transported from the United States. During the spring and summer they become spoiled during the three or more weeks required to get them from the dealer in New York into the hands of the company cooks in Cuba. Meanwhile sweet potatoes, cabbage, onions, kershaw, pumpkin, squash, beets, turnips, yams, plantains, and bananas can be obtained in abundance in Cuba at almost any season of the year. Major Kean's suggestions provide also that in the field canned tomatoes or other canned or dried vegetables may be issued instead of fresh vegetables or to make up a deficiency in the supply of the latter. If desired by company commanders, a commutation price of 5 cents shall be paid instead of the allowance of fresh vegetables when these can not be supplied by the Subsistence Department in the field. The commutation price for fresh vegetables is intentionally made about double the ordinary market value of the vegetable component because of the difficulty of making purchases cheaply and to the best advantage on field service.

Lastly, it is suggested that when the chief commissary of the command finds it impracticable to supply ice, a commutation of 1 cent per pound should be paid in lieu thereof.

There is no doubt that the more liberal the commuted value of the savings of the ration the better will be the dietary of the soldier. It must be noted, however, that Major Havard, chief surgeon of the division, who surveys the whole field in Cuba, is of the opinion that the ration, under the supervision of intelligent officers, is ample to furnish everything requisite.

Ptomaine poisoning.—Four instances of ptomaine poisoning were reported during the past fiscal year. The transport *City of Rio de Janeiro* left Honolulu, H. I., October 17, 1899, for Manila, P. I., carrying about 700 officers and men of the Thirty-fifth United States Volunteer Infantry, C. W. Fry, acting assistant surgeon, in charge, and Maj. H. O. Perley, surgeon, United States Army, a passenger on board. Five days later 25 cases of gastro-enteritis occurred, the disease being chiefly confined to one company. This outbreak was at the time attributed to the use of canned goods purchased by the men from the commissary stores on board the transport. Under this impression further sale of these was prohibited. Next day, however—that is, on the evening of the 23d and morning of the 24th—289 enlisted men and 2 officers were attacked with abdominal pains, vomiting, diarrhea, headache, muscular prostration, and great thirst. All these symptoms were not manifested equally in every case. In 42 the headache was very severe, and in 18 the diarrhea could not be restrained. Muscular weakness was present in all, and in 35 there was excessive perspiration, with coldness of the skin, cramps of the legs and arms, aching of the joints, great restlessness, and muscular twitchings. In a few of the cases prostration was very great and the pulse feeble. One man died at the end of eight hours. On investigation it was found that all who were sick had eaten of the fresh meat issued to the men on the evening of October 23. The use of this meat was discontinued. No further sickness occurred.

On March 25, 1900, out of a company of 94 men of the Eleventh United States Infantry, forming part of the garrison of San Juan, P. R., 57 were admitted to hospital and 10 became slightly sick, but did not apply for treatment. The symptoms were persistent vomiting, severe cramps in the stomach, purging, great prostration, dilatation of the pupils, headache, clammy perspiration, chilliness, and great thirst. The stomach in each case was washed out by means of the stomach tube. In some cases the stomach was empty, and nothing but water and mucus came away; in others the washings were tinged with bile, id in others again a moderate amount of food that had been eaten for reakfast was washed out, but in no case was the stomach overdistended even full. The vomiting was controlled in several instances by the ashing out of the stomach, but in many it persisted for several hours terwards. The prostration was so great that some of the patients inted before reaching the ward. A large number vomited blood in nall clots, in most instances mixed with nothing but mucus, showing iat the hemorrhage had not taken place until after the contents of ie stomach had been expelled. Purging began in most before the omiting had ceased, and continued for twelve to fifteen hours. At rst the stools were natural, soon watery, afterwards becoming mucus nd blood tinged. Cramps in the voluntary muscles were mild in ome, but other patients writhed in agony, their sufferings being elieved only after thorough kneading and massage by the hospital ttendants. Forty were discharged from hospital on the following norning; the others from day to day until the fifth morning, when all vere returned to duty.

A careful study of the food eaten that morning led the surgeon, apt. George M. Wells, assistant surgeon, United States Army, to efer this general attack to the condensed milk used with the mush urnished for breakfast.

Acting Asst. Surg. L. B. Sandall reported two instances in Company L, Ninth United States Infantry, at Concepcion, P. I., one on March 13, the other on May 13, 1900. Forty-four men were affected n the one case; 28 in the other. All recovered after suffering from omiting, watery stools, profuse cold perspirations, and cramps in he thighs, legs, and feet. Corn-beef hash was considered to be the ause of the trouble, but the cans when opened appeared to be in erfect condition.

CLOTHING.

The clothing issued by the Quartermaster's Department has given satisfaction to the troops, whether serving in Alaska, in the severe climate of Montana and Dakota, or in the islands in the Tropics. At first, as stated in my last annual report, the unsuitability for use in the Tropics of the clothing worn by the troops on their arrival in the islands was indicated by many medical officers, and many suggestions were submitted. During the past year, however, only a few critical references to clothing are to be found in the sanitary reports. These relate chiefly to stiffness or a want of pliability in the texture and of uniformity in the color of some of the khaki issues. Khaki cloth of the strongest texture is required to withstand the wear and tear of the rough field service experienced by our troops in the Philippines, and this strength of texture is incompatible with a high degree of pliability, particularly while the uniform is new. It is understood that the Quartermaster's Department has made great improvement in the texture and coloring of the field uniform during the past year.

PREVALENCE OF SPECIAL DISEASES.

MEASLES.

In the Army, Regulars and Volunteers, in 1899 there were reported 2,755 cases of measles, with 3 discharges for disability and 37 deaths. These are equivalent to an admission rate of 26.10 and a death rate of 0.35 per thousand of strength. The rate of fatality or percentage of fatal cases was 1.34, or 1 death in 74.5 cases. The rates of admission and death were higher among troops serving in the United States than among those on foreign service, the admission rate in the home camps and garrisons being 32.61 and the death rate 0.71 per thousand of strength.

In 1898 there were reported 7,389 cases, 7 discharges, and 70 deaths. These are equivalent to an admission rate of 49.98 and a death rate of 0.47 per thousand of strength. The percentage of fatal cases was 0.94, or 1 death in 105.5 cases. During this year also the prevalence was somewhat greater in the United States than among the troops in the islands.

As showing the care given by medical officers to prevent the spread of the infection of this disease, several instances are on record of the successful passage of troops across the Pacific with one or more cases of measles in isolation on the transport. Thus a case occurred on the transport *Pathan*, carrying the Forty-sixth United States Volunteer Infantry en route from San Francisco, Cal., to Manila, P. I., when sixteen days out from her port of departure. The patient was promptly isolated and the disease suppressed.

SCARLET FEVER.

Only 47 cases of scarlet fever were reported as having occurred in the Army, Regulars and Volunteers, in 1898, and 22 in 1899. Seven of these were fatal in the former year; none in the latter.

SMALLPOX.

In 1898 92 cases of smallpox were reported, with 23 deaths, and in 1899 347 cases, with 84 deaths, a total of 439 cases, with 107 deaths, during the two years. Of these cases, 342, with 99 deaths, occurred in the Philippines, the fatal cases constituting 29 per cent of the total number. Seventy-two cases, with 3 deaths, occurred in the United States, the fatal cases constituting only 4.17 per cent of the total number.

That the regular troops were better protected from the infection of smallpox than the volunteers is shown by the relative prevalence of the disease among the troops in the Philippines in 1899, where large mixed commands operated during the whole year in a dangerously infected country. Among a mean strength of 22,922 regulars there occurred 110 cases, of which 23 proved fatal, while among the volunteers, with a mean strength of 16,358, there occurred 157 cases, 55 of which were fatal. The rate of admission per thousand of strength among the regulars was 4.80, among the volunteers 9.60; and while the death rate among the regulars was only 1 per thousand men, among the volunteers this rate was 3.36 per thousand.

Vaccinia.—During the year 1898 6,916 men were taken on sick report as excused from duty on account of vaccinia, and of this number 1 man, belonging to a command stationed in the United States, was discharged for disability. In 1899 6,895 were taken on sick report, and 1 man in the Philippine Islands was reported as having been discharged for disability and 1 in Cuba as having died as a result of the vaccination.

The discharge reported as having taken place in the United States ras that of F. B., private, Company E, Third Missouri, who was dmitted into St. Agnes' (civil) Hospital, Philadelphia, Pa., August 29, 898, suffering from "septicæmia from vaccination." He was reported ischarged September 23. The discharge for disability in 1899 from roops in the Philippines really took place in the United States, the nan having been left behind sick by his regiment on its departure for ervice in the Division of the Philippines. Private A. C., Company , Sixth United States Infantry, was admitted into the post hospital, 'ort Sam Houston, Tex., April 7, 1899, with vaccinia, complicated pril 17 with axillary abscess. He was discharged June 13, 1899, "on ccount of septicæmic abscess of left axillary and pectoral regions due o vaccination and resulting in contraction of the fasciæ and muscles, npairing the use of the arm." The death reported from Cuba was hat of A. K., private, Third Nebraska, First Division, Seventh Army orps, who died at Havana, Cuba, 1899, from "tetanus resulting from nfection from vaccination."

But besides these cases, which were attributed on the reports directly o vaccination, a careful examination of the history of cases recorded nder the headings septicæmia, tetanus, etc., has shown that the operation of vaccination was the starting point in several other cases which had untoward results. These include 1 case of erysipelas ending n recovery; 1 case of discharge on account of the results of vaccination, which case is not included in the tabulation for the year 1899, as the lischarge did not take place until the year 1900; 6 fatal cases of septicæmia, 5 of which occurred in a detachment of recruits at Camp Merritt, Cal., and 1 case of death from tetanus.

I. J. J. O'N., private, Company D, Ninth United States Infantry, was taken on sick report at Madison Barracks, N. Y., January 27, 1899, on account of vaccinia. He was returned to duty February 1, but on the report of the transport *Zealandia*, en route to the Philippines, his name again appears as admitted to sick report April 1, 1899, for erysipelas following vaccination. On April 7 he was returned to duty.

II. W. J. J., private, Company E, First United States Infantry, was admitted March 4, 1899, to the post hospital, Pinar del Rio Barracks, Cuba, for vaccinia, and was returned to duty on the 11th, but his name appears again on the reports as admitted March 15 with vaccinia and returned to duty on the 17th. On May 1 he was admitted to the post hospital at Guanajay, Cuba, for neuritis of the left arm from vaccination, and was transferred May 4 to the hospital ship *Missouri* as a case of false anchylosis of the left elbow following infected vaccination. The hospital ship brought him to Fort Wadsworth, N. Y., where, on the records, the remark appears, "This man has had no anchylosis since admission to this hospital, but complains of neuralgic pains in his left arm." On August 25 he was returned to his company, which appears to have been again stationed at Pinar del Rio Barracks, Cuba, for on the report from that post his name appears as admitted to sick report September 27, 1899, on account of "loss of power and sensation, left arm, secondary to severe pus infection at time of vaccination, February, 1899; hand swollen and cold." He was transferred to military hospital No. 1, Havana, Cuba, October 5. Here the record states the cause of admission to have been "loss of power and sensibility in the left arm due to vaccination." He was discharged January 13, 1900, on account of "paralysis of left arm and forearm, the result of vaccination."

III. G. S., private, Company K, First South Dakota, was admitted into regimental hospital June 26, 1898, for vaccinia, and was returned to duty June 28. He was admitted into the field division hospital, Presidio of San Francisco, Cal., July 18, 1898, with synovitis of the right knee, and was discharged on certificate of disability next day on account of chronic synovitis of the left knee joint. He did not leave the hospital, but was taken up on the records July 20 as a discharged soldier with abscess in left axilla following vaccination. The abscess was incised and curetted July 27. Septicæmia was developed August 1, and the patient died August 4 of "septicæmia following axillary abscess."

IV. A. L. H., recruit, Company E, First Colorado, was admitted to the French Hospital (civil), San Francisco, Cal., August 4, 1898, where he died next day; cause of admission, septicæmia following vaccination.

V. J. G. M., private, Company C, First Tennessee, was admitted into regimental hospital with vaccinia July 23, 1898, and returned to duty on the 24th. He was readmitted on the 31st and sent to the division field hospital of the Independent Division of the Eighth Army Corps August 1 with vaccinia complicated with abscess of the left axilla, and on August 6 with septicæmia. He is reported to have died August 16 of "septicæmia following axillary abscess."

VI. E. D., recruit, First Colorado, died August 21, 1898, of septicæmia at San Francisco, Cal. No mention is made of vaccination in the report, but the case is stated by Colonel Forwood, chief surgeon of the Department of California, as one in which the septicæmia was sequent to vaccination.

VII. A. W. S., private, Company E, First Colorado, died August 23, 1898, of "septicæmia" in the French Hospital (civil), San Francisco, Cal. The records show that the death was sequent to vaccination.

VIII. H. F. C., private, Company I, Third Texas, was admitted into the post hospital, Fort McIntosh, Tex., November 30, and died December 3, 1898, from "septic poisoning." This case was sequent to vaccination.

IX. C. R., private, Company A, Twenty-fourth United States Infantry, died of tetanus on the *City of Para*, en route to the Philippine Islands, August 5, 1899. The following report of his case was given by Capt. Charles E. B. Flagg, assistant surgeon, United States Army:

> Private C. R., colored, Company A, Twenty-fourth Infantry, from Sunnyside, S. C., was vaccinated, July 17, with glycerinated virus. The arm was scrubbed with green soap and water, then washed with bichloride solution and then with boiled water, preparatory to vaccination. After vaccination a dressing of sterilized gauze was applied and fastened by adhesive plaster. August 3 he reported at sick call, complaining of pain in his neck and stomach; he had been sick all night. He was given a cathartic and directed to report to the doctor if not feeling better in a few hours. August 4 he suffered greatly all night, but no surgeon was called. Assistant Surgeon Greenleaf saw him in the morning and diagnosed tetanus; trismus was marked. The patient was given 24 mgms. of sulphate of morphine hypodermatically and 2 grams of chloral hydrate by rectum at once. He was then put in a cabin on the main deck and kept as quiet as possible. Convulsions increased in frequency until they occurred every two minutes at 11.30 a. m., when he was given 24 mgms. of morphine hypodermatically. At noon he swallowed 45 c. c. of water. At 1 p. m. his temperature was 99.6° F.; he could not swallow. An enema of sulphate of magnesia, glycerine, and water was given and retained. An ineffectual attempt was made to pass the catheter, two strictures being encountered. A hot-water bag was put over the pubes and he urinated spontaneously sometime afterward. At 5 p. m. he was

given 1 gram of chloral, 2 grams of sodium bromide, and 30 c. c. of liquid peptonoids by means of a catheter introduced through the nose into the stomach, the nose being previously cocainized. At 7 p. m. the dose was repeated, malted milk being substituted for the peptonoids. At 9 p. m. the 5 o'clock dose was repeated. Convulsions became more frequent. At 11 p. m. 16 mgms. of morphine were given hypodermically. The bowels moved slightly, seeming to give great relief.

At 1 a. m. August 5 the patient was sleeping. At 2 a. m. temperature 100° F. At 3 a. m. 16 mgms. of morphine were given hypodermically. At 4 a. m. the patient was sleeping. At 5 a. m. an enema of chloral, bromide, and liquid peptonoids, as above, was given. At 6 a. m. the temperature was 105.2° F., pulse 129, respiration 30, and convulsions severe. At 7 a. m. patient was sleeping. At 8 a. m. temperature 106° F., pulse 108, respiration 30. At 8.30 a. m. temperature 107° F., pulse 108, respiration 30; an ice cap was applied to the head and 16 mgms. of morphine given. At 10 a. m. temperature 107° F., pulse uncountable, respiration 40; convulsions practically continuous. He died August 5, at 11.30 a. m.

The point of vaccination presented a denuded area the size of half a dollar. There was apparently no swelling or injection of the surrounding tissues. The patient was conscious throughout the disease. He complained of great pain in his neck and abdomen. Opisthotonos was marked. The temperature which at death was 107.4° F., was 108° half an hour afterwards.

The five deaths which occurred in August, 1898, at San Francisco, Cal., indicate the use of a contaminated virus, such as gave rise during the civil war to many instances of serious results following inoculation with matter from crusts or scabs. The haste with which the volunteer regiments were aggregated at Camp Merritt, Cal., and subsequently embarked for Manila accounts for the fact that none of the regimental surgeons of the regiments in which the fatal cases occurred made special investigation into the cause of the untoward results which followed their vaccinations.

The number of men vaccinated is not known, but probably all the accepted recruits for the Regular Army—54,896 in 1898 and 47,899 in 1899—together with 250,000 United States and State Volunteers, were vaccinated or revaccinated in accordance with regulations. As vaccination on the arm often renders it inconvenient for a man to handle his musket at drill, most of the reported cases of vaccinia were, no doubt, excused from duty on account of slight inflammatory action at the vaccinated spot. The number taken on sick report in 1898 represented 46.80 per thousand of strength; in 1899, 65.33, as compared with 28.29 in the Regular Army during the year of peace, 1897, and with 34.57, the mean annual rate of admission during the previous decade.

In many instances, particularly in the Division of the Philippines, vaccination had to be repeated several times on account of the inertness of the vaccine. Lymph sent from San Francisco, Cal., lost its activity during the long voyage. Ultimately fresh vaccine was successfully produced by the board of health of Manila, and the troops in the Division of the Philippines became fairly well protected from smallpox. Lymph was supplied by this board for the vaccination of the population of many of the garrisoned towns with the result of markedly lessening the prevalence of smallpox. Major Edie, president of the Manila board, has stated that the result of the work of vaccination in Manila is shown by the records of the city board of health. For the nine months from October, 1899, to July, 1900, there were 7 deaths from smallpox in the city, whereas in the one month of March, 1899, prior to the systematic use of vaccination, there were 75 deaths from this disease.

On April 1, 1900, a vaccine farm was established at Iloilo, Panay, from which virus is supplied to all parts of the Visayas, both for the vaccination of troops and of the natives. The virus from this farm has been more effective in these southern islands than that from the board of health of Manila, as it is delivered and used without the delay incident to transportation from a distance.

The inefficiency of vaccine lymph which has been kept for some time has been repeatedly noted by our medical officers. The following, by Capt. Charles E. Woodruff, assistant surgeon, United States Army, Fort Riley, Kans., August 19, 1900, is to the point:

> In compliance with your general instructions to report upon the character of the vaccine lymph supplied, I have the honor to make the following report of our experiences with vaccination at this post during the present year, as it seems from the facts mentioned below that quite a large percentage of vaccinations as ordinarily made, perhaps 25 per cent, are worthless, and that from 5 to 10 per cent of the soldiers leave for foreign service unprotected.
>
> On account of the wide spread of smallpox last winter in this part of the country, every one who had not been recently successfully vaccinated was revaccinated. In this work I found the usual state of affairs which I have found in other army posts, namely, a large per cent of our vaccinations were successful in spite of repeated unsuccessful attempts in recent years. As small squads of recruits were coming in at all times, their vaccinations were investigated, and all cases unsuccessful elsewhere were tried over again here. Such a large per cent of these cases were successful here that it seems almost to be a rule that an unsuccessful vaccination in a recruit at the recruiting station, instead of showing immunity to variola, is far more apt to mean that the lymph used was inert. In a few squads not a single man was found protected, though all had been operated upon at the recruiting station. In a squad recently arrived from another post we thought that 22 of the 24 should be revaccinated, and we got 11 good results; 3 of these had never been successfully vaccinated in their lives and in 1 it had been tried five times unsuccessfully. Organizations seem to be in just as bad a condition. In a battery which arrived here in the spring I found 39 who apparently needed vaccination, and we got 31 good results. In these 31 there were 10 who had never been successfully vaccinated, and some of these said that they had never been vaccinated at all, even at enlistment, and all these men were traveling through a country in which an epidemic was raging.
>
> In January I vaccinated on one day 22 children with glycerinated lymph 8 weeks old. Though the tubes had been kept in a cool, dark place and had not been exposed to heat, light, nor cold, the lymph was absolutely inert, as not a case was successful, though more than two-thirds of the cases were primary vaccinations. These 22 were again vaccinated with fresh lymph, and 20 were successful. This shows that glycerinated lymph will not remain potent as long as we were first informed that it would. As a few cases of soldiers unsuccessfully vaccinated with lymph on hand three or four weeks were subsequently successful with fresh lymph, we have adopted a rule to make frequent requisitions for small amounts, and to keep on revaccinating recruits until it is successful, unless a good scar shows evidence of being less than ten years old, when we cease after two unsuccessful trials. So far we have made over 1,500 vaccinations and have found but one man who had never been successfully vaccinated in his life and in whom we have failed after repeated trials, which may, perhaps, be one of those rare cases of immunity acquired prenatally.
>
> In regard to bacterial infections the lymph is excellent. The great majority of the successful cases are nearly perfect. In only a few do we get inflamed swollen arms, indicative of other infections, and in none have we had pus formation. In the very few in which there has been sloughing and the formation of a large ulcer, there is some evidence that the infection was due to interference with the arm and did not come from the lymph.

The satisfactory results produced by the general vaccination of the natives in the district of Holguin, Cuba; in Porto Rico (see my last annual report, pp. 191, 245, and 246), and in the Philippines, in suppressing the ravages of smallpox, must be regarded as one, and not the least, of the benefits brought by our occupation to the natives of these islands.

BUBONIC PLAGUE.

During the past year bubonic plague, the black death of the Fourteenth Century, has attracted the attention of medical men and caused much anxiety to the public by its invasion of the Western Hemisphere and of the Pacific Islands, which now form part of the territory for the government of which the United States stands responsible before the world. This disease has a history which extends back into remote antiquity. Its ravages in Europe in the middle ages are matters of history, but with the advance of sanitary knowledge in the eighteenth and nineteenth centuries this deadly disease lost its hold upon what may be regarded as the civilized communities of the world. An outbreak occurred occasionally in certain localities into which the infection was introduced, as in Marseilles, in 1720, where a severe epidemic occurred in which the mortality was estimated as being between 40,000 and 60,000. Other local epidemics occurred subsequently to this date. Thus in 1771 nearly one-fourth of the population of Moscow was destroyed by the disease; but on the whole the disease receded from Europe until it found a resting place on the Volga, in southeastern European Russia, with its headquarters farther east in Asia, extending into the Chinese dominions. It seemed as if modern sanitary conditions had put an end to the ravages of the plague, as they had taken the deadly sting from typhus fever and repressed the propagation of cholera. Nevertheless a recrudescence of the disease occurred in 1894 which alarmed the whole of the civilized world. The last appearance of oriental plague in Europe, until this recent recrudescence, was an outbreak on the banks of the Volga in 1878–79. The disease had previously prevailed in a mild form in the vicinity of Astrakhan, and was probably introduced from that locality. An interesting fact in connection with this epidemic is that in Astrakhan the disease was so mild that no death occurred, and that the earlier cases on the right bank of the Volga were of the same mild form, but that the disease there increased rapidly in severity and soon became so malignant that scarcely any of those attacked recovered. This is to some extent the history of epidemics elsewhere, and not only of plague, but of other infectious diseases, such as typhus fever, cholera, and yellow fever. In all of these diseases the outset of an epidemic may be characterized by cases so mild in character that they are not recognized, and during the progress of the epidemic many such cases may continue to occur. These cases are evidently especially dangerous as regards the propagation of the disease, for when they are not recognized no restriction is placed upon infected individuals, although they may be sowing the the germs broadcast.

The termination of an epidemic in the presanitary period depended to a considerable extent upon the fact that those who suffered a mild attack acquired thereby an immunity, and that when the more susceptible individuals in a community had succumbed to the prevailing epidemic there was a necessary termination of the epidemic for want of material. This is illustrated in such cities as Havana and Rio Janeiro, where yellow fever is an endemic disease. The natives of these cities have an immunity which probably results from their having suffered a mild attack during childhood, and the epidemic prevalence of the disease depends upon the presence of "unacclimated" strangers.

The disease indeed seemed to be almost a thing of the past and no longer gave any uneasiness in the countries of Europe which had formerly suffered from its ravages, when in February, 1894, it made its appearance in the city of Canton, China, and three months later in Hongkong. The disease is known to have been epidemic in the province of Yunnan, which is about 900 miles distant from Canton, since the year 1873, but it attracted little attention until the lives of Europeans living in the city of Hongkong were threatened by the outbreak of an epidemic among the Chinese residents of that place. Many thousands of deaths occurred in Canton during the three months which elapsed after its introduction to that city before it effected a lodgment in Hongkong.

Fortunately this outbreak gave the opportunity for competent bacteriologists to make scientific investigations relating to the specific cause of this scourge of the human race and to the demonstration that it is due to a minute bacillus. The discovery was first made by the Japanese bacteriologist Kitasato, who had received his training in the laboratory of the famous Prof. Robert Koch, of Berlin. This discovery was made in the month of June, 1894, in one of the hospitals established by the English officials in Hongkong. About the same time the discovery was made, independently, by the French bacteriologist Yersin. From this time the study of plague has been established upon a scientific basis, and very material additions have been made to our knowledge with reference to the prevention and treatment of the disease. We have learned that certain of the lower animals, including rats and mice, are very susceptible to infection, and that they play an important part in the propagation of the disease; also that the germs are found not only in the blood and in pus from suppurating buboes, but also in the discharges from the bowels of infected individuals. This being the case, it can readily be seen how important a strict sanitary police is in arresting the spread of an epidemic. As in other filth diseases in which the germ is present in the excreta of the sick, insects, and especially fleas and house flies, probably play an important part in the spread of the disease.

From Hongkong the infection was carried to Bombay, in which in the last week of December, 1896, the mortality was 1,384. In January, 1897, the mortality was nearly 5,000, and in February 4,600, although by this time the population of the city had been diminished by about one-half by the flight of its inhabitants. In March there was a noteworthy reduction in the number of deaths, and this continued during April and May, and in August the disease had almost disappeared, but early in 1898 there was a recrudescence of the epidemic, and in November of that year the total mortality had reached 26,423. The disease extended throughout the Bombay Presidency, following, as a rule, the lines of the railway. In this way it reached Surat and Buroda, on the northern line, Poona, Carad, and Miraj, on the southern, Calcutta and Nasik on the eastern, and Scholapur and Hyderabad upon the southeastern. The total mortality in the Presidency of Bombay up to November 11, 1899, was 164,083.

Thence the plague was introduced into Alexandria, in Egypt, and in August, 1899, it made its appearance in Oporto, Portugal. In October, following, it crossed the Atlantic and invaded American shores at Santos, Brazil. Cases of plague from Santos were received at the New York quarantine station and there stopped. In December, 1899, the disease was discovered in Honolulu, H. I., apparently introduced from the Orient, but it was confined to the Chinese quarter, and the vigorous repressive measures instituted by the local authorities prevented its general spread. No case occurred among the military population on the island.

Reports were received also concerning the presence of the disease in the Chinese quarters of San Francisco, Cal., but the energetic action of the health office of the city suppressed the infection.

Ultimately also in December, 1899, plague appeared in Manila. Two cases ending fatally occurring in the same house were reported as typhoid fever; a third case seen during life was recognized as plague. Other cases occurred in the same neighborhood. A house to house inspection was started at once. One death occurred in December, 1899, 11 in January, 1900, 35 in February, 49 in March, 44 in April, 17 in May, and 11 in June, while during each of these months from 40 to 80 Chinese died from causes unknown, they having been without medical attendance. The cases of plague reported numbered 225, of which only 58 recovered.

Only 1 American died of the disease, an employee of the quartermaster's department. His case was reported from military hospita No. 3, on May 20. He died next day at the pest hospital. Ward E, of hospital No. 3, in which the case was discovered, is 92 by 34 feet. It contains 55 beds, of which 53 were occupied at the time. It is elevated 3 feet above the ground, and has about 57 square feet and 800 cubic feet of air space per patient. The ventilation is perfect, as the broad verandas,which surround the ward, permit the 14 windows to be always open. The ward has no direct communication with any other, and its basement is well ventilated. It was not considered necessary to subject the whole of hospital No. 3 to quarantine; but the following circular was issued by Capt. John S. Kulp, assistant surgeon United States Army, commanding the hospital:

> All passes from this hospital are suspended until further notice.
>
> Natives who are not employees will not be permitted to pass the sentries.
>
> E ward is hereby declared quarantined, and all persons are forbidden to hold communication with its occupants.
>
> No officer, soldier, or civilian will enter the hospital without the authorization of the officer of the day.

A strict quarantine was established in regard to the infected ward, every man being personally instructed in his duties, the main provisions of which were included in the following orders:

SPECIAL ORDERS No. 68.

1. Ward E, its personnel, and its contents are hereby declared in quarantine.

2. No person, except the ward surgeon, will be permitted either ingress or egress. There will be a sentry posted at either door to enforce this order, and two men will be detailed as intermediate food and refuse carriers.

3. All supplies will be brought to a table (outside the south door), placed thereon, and left there. They will be taken from there to the doorsteps by the two intermediate carriers and left there. They will then be taken inside the ward by the men therein. *No person will go within 20 feet of the intermediate carriers, or the inmates of the ward.*

4. Soiled linen will be placed in a 1:100 trikresol solution, and after four hours removed from the ward. Food containers will be set outside as soon as emptied, and will be scalded out by the kitchen force as soon as received. Stools and urine will

be disinfected by dry earth and trikresol in the ward rear, and all garbage properly disinfected by trikresol or lime before being removed.

5. The ward storeroom will be closed until further orders.

6. No dishes, furniture, nor reading matter will be removed from the ward.

7. The floor of the ward will be well mopped daily with a 1:100 solution of trikresol, and each patient will be given a daily sponge bath, using 1:4000 bichloride for that purpose. The ward master will keep a check of these baths.

8. Under no circumstances will natives or pet animals be admitted to the ward or allowed near it.

Special Orders No. 69.

1. The enlisted men of this detachment will bathe in bathroom No. 2 daily, so long as the present quarantine exists. Each man will bathe at the most convenient time, and will report thereafter to the bath steward for check.

2. Ward masters (except of E ward) will provide the bath steward with a daily check-list of such of their convalescents as are able to use bathroom No. 1. This list will be checked and returned. All patients unable to bathe in the bathroom will receive a daily bath in their wards.

3. Ward surgeons will impress upon their subordinates the necessity of absolute cleanliness of person and surroundings. All soiled linen will be immersed in 1:100 trikresol in the linen room for four hours before being turned over to the laundry.

It will be observed that no person was permitted entrance to or egress from the ward. The "intermediate carriers" were themselves isolated separately from the inmates. All received explicit instructions as to frequent hand and face washing, especially before eating, and the rationale of the whole quarantine was carefully explained.

The report of Acting Asst. Surg. Lester W. Lord, in charge of the ward at this time, was as follows:

I have the honor to report concerning the recent quarantine of ward E. Upon taking charge of the ward on May 20, after the establishment of the quarantine, all orders were carefully explained to its inmates. Since then all occupants have taken a daily sponge bath of 1:4000 bichloride; all soiled linen has been placed in a 1 per cent solution of trikresol for four hours before its removal; the floors have been mopped daily with the same solution; and excretions disinfected with pure trikresol, covered with dry earth and lime, and then removed. The guards placed at the doors allowed none to approach within 20 feet, save the intermediate carriers, whose office was to bring the supplies to the doorsteps, and to remove the waste.

On May 21 and 22 all inmates received a subcutaneous gluteal injection of plague prophylactic. Twenty-one of these received 1 c. c. each of the marine-hospital product, and the remainder 5 c. c. each of the Hongkong preparation. Very little inconvenience was experienced, although in a few cases there was a slight rise of temperature and a little soreness at the site of the inoculation. Both passed away in from twelve to twenty-four hours. No puncture abscesses occurred.

On the 23d two suspected cases were sent to the plague hospital, but were subsequently discharged as noninfected. Their mattresses were burned, the bed frames washed in 1:500 bichloride, and their personal effects wrapped in cloths moistened with the same solution.

The ward surgeon, before entering the ward, discarded superficial clothing, and wore a sheet covering the body from the neck to the heels. Each time after leaving the ward he subjected himself to a sponging of the face and hands in a 1:1000 bichloride solution. This was followed by a shower bath and an entire washing with soap and water.

After a period of eleven days the quarantine was raised on the recommendation of a board of three medical officers, by whom each patient in the ward was examined. Captain Kulp made the gratifying statement, in his report, that practically every man of the hospital corps appeared anxious to secure experience in nursing this disease, the spread of which was prevented by the intelligent cooperation of the officers and men of the hospital.

A second case in a quartermaster's employee was reported by the health board of Manila. This case is said to have recovered. It occurred in the quartermaster's corral on May 27. There were more than 400 employees in and about this corral. Two hundred and forty of them slept in one set of quarters, a bunk house of nipa and bamboo. Few of them paid any attention to personal hygiene, and their sanitary surroundings were miserable. Major Edie's opinion, from his experience as health officer of Manila, is that little difficulty will be found in controlling the plague in any intelligent community with modern sanitary conditions. His report, which deals with smallpox and leprosy, as well as plague, is submitted in this place:

> I have the honor to make the following report on the work of the board of health of the city of Manila. My duties with the board of health were pursuant to the following orders: Special Orders No. 181, paragraph 10, headquarters Department of the Pacific and Eighth Army Corps, Manila, P. I., July 5, 1899, and Special Orders No. 142, paragraph 5, headquarters provost-marshal-general, Manila, P. I., July 31, 1899. Before receiving the first order I was taken down with typhoid fever, and had a relapse a few days after complying with the second, so that my duties with the board of health really began on August 28, 1899.
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> The medical personnel of the board for the past year has been as follows:
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> Lieut. William J. Calvert, assistant surgeon, United States Army, in addition to his other duties as regimental surgeon, Sixth United States Artillery, and attending surgeon on the prisoners of war, was assigned to duty on the board of health, July 31, 1899. He was relieved from his other duties January 7, 1900, and, besides directing the bacteriological department of the municipal laboratory, has had charge of the plague hospital.
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> Capt. Charles Lynch, assistant surgeon, United States Army, reported for duty with the board, December 24, 1899; Maj. Ira C. Brown, surgeon, United States Volunteers, January 9, 1900; Acting Asst. Surg. Julius C. LeHardy, United States Army, January 26, and Acting Asst. Surg. Harry L. Gilchrist, June 16, 1900, the latter relieving Major Brown who had been ordered for temporary duty with the transport *Hancock*. During the temporary absence of Assistant Surgeon Calvert in Japan, in March and April, Acting Asst. Surg. Joseph J. Curry, United States Army, conducted the bacteriological department, made all autopsies, and rendered valuable service in other ways.
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> Dr. C. H. Pardo-Tavera and Dr. Ariston Bautista Lim, both of Manila, have been honorary members of the board of health since its organization in September, 1898.
>
> As originally organized the city had 10 districts with 8 municipal midwives, and for each district a native physician, whose duties were to attend to the indigent sick, report unsanitary conditions and infectious diseases, and investigate and give certificates of death to all cases that have died without medical attendance. By the extension of the city limits to Pandacan and Santa Ana a new district was created, which was provided with a physician, a native of the district.
>
> Besides the general functions belonging to a board of health in supervising all works and conditions affecting the public health, the board had general supervision over the charitable institutions, prisons, and venereal hospital, and the direct control of the vaccine farm, municipal laboratories, bacteriological and chemical, which the board organized, free dispensary, hospitals for leprosy, smallpox, and bubonic plague, and much other work that the individual members were from time to time called upon to do.
>
> *Registration of births, marriages, and deaths.*—The department of registration of births, marriages, and deaths in former times was in charge of the parochial priests. The board has endeavored to keep these records, but it only pretends to accuracy in the records of deaths. It also required the registration of physicians, pharmacists, and dentists practicing their professions. It was with some difficulty that the superintendents of the parochial cemeteries could be prevented from interring bodies without a burial permit and make the weekly return of burials required. After a clear understanding of the necessity of these requirements the regulations were complied with.
>
> A municipal dispensary, where the indigent sick can obtain medicines free of cost, has been in operation since December, 1899. Nevertheless the majority of births and deaths occur without medicines or medical treatment.
>
> *Vaccination and smallpox.*—The board continued the work of vaccination and revaccination begun by Major Bourne. The result of this work is shown in the table of mortality statistics. For the nine months from October, 1899, to July, 1900, there were 7 deaths in this city from smallpox, whereas in the month of March alone, in

1899, there were 75 deaths from this disease. The subjoined table shows the number of vaccinations, by months. This work was done under difficulties, as the authorities thought it advisable not to permit forcible vaccination. Many cases of smallpox came into the city from the country districts, and the board sent its vaccinators to all outlying towns and villages for the purpose of vaccinating every inhabitant. Records of these vaccinations were not returned except from the town of Malabon. After the dispersion of the Filipino army, as the country became opened up, the military surgeons in every district, under directions from the chief surgeon's office, began the vaccination of the inhabitants, and the output of the vaccine farm had to be largely increased, as is shown in the attached table. This increase was made with little additional expense, and every demand for vaccine virus was promptly met. When the present wet season is over, and this subject of vaccination in the provinces is vigorously taken hold of and carried on until every person in these islands has been vaccinated and revaccinated, the vaccine station will be prepared to furnish the necessary amount of virus.

Leprosy.—Leprosy was introduced here in 1633. The Emperor of Japan sent a ship with 150 lepers as a present, to be cared for by the Catholic priests. These lepers were allowed to land, and as no practical methods were ever adopted to eradicate the disease or prevent its spread, it steadily increased, until now, according to the estimates of the Franciscan fathers, there are not less than 30,000 lepers in the archipelago, the larger number being in the Visayas. Under the Spanish régime the order of the Franciscans had charge of the charity work among the lepers. Several hospitals and asylums were built, the largest of which, San Lazaro Hospital, is located in Manila, and has a capacity for 400 patients. When a house-to-house inspection was inaugurated last January, more than 100 lepers were found concealed in houses and were sent to San Lazaro Hospital. Many others escaped into the surrounding country. The necessity of the segregation and isolation of the lepers on one of the islands was early recognized and agitated by the board of health. As soon as the conditions permitted, the authorities appointed a commission to select a suitable island or islands for this purpose and to present plans and estimates for buildings and to formulate the necessary regulations. This commission is now engaged in this work.

Bubonic plague.—The first case of plague in this city of which we have any knowledge occurred in No. 14, Calle Legaspi, Intramuros, on December 29, 1899. There was a death in this house, the diagnosis on the death certificate being typhoid fever. Two days later, December 31, a second death was reported from the same house with a similar diagnosis. These two cases died without medical attendance, and the diagnosis was made by the municipal physician of the district after death. On January 2, a boy was removed from this house to the San Juan de Dios Hospital, having been taken sick the day previous, and the notification required in cases of infectious diseases reached this office on the 2d, the diagnosis being typhoid fever. Assistant Surgeon Calvert and myself visited this boy at the hospital and found him presenting the clinical aspect of plague. The inflamed gland was in the left femoral group; it was about the size of a pigeon's egg, and very tender to the touch. The boy was at once removed to the pest hospital, which, in anticipation of an increase of smallpox, had been constructed of tents, as the authorities had decided that the state of the public funds did not justify the expenditure necessary to erect a pest hospital. On January 3, 2 cases were discovered at No. 8, Calle Legaspi; on the 6th, 1 case at No. 6, Legaspi; on the 13th, 2 more cases developed at No. 8, Legaspi. Bacteriological examinations and culture growths were made in nearly all the cases. A report of this work, with a description of the clinical features of the plague as it appears here, will be made by Assistant Surgeon Calvert.

The methods adopted to control and eradicate the disease were:

1. The prompt detection and isolation of plague cases.

2. Removal of persons who had been in close communication with an infected case to the suspect wards at the hospital.

3. Removal of all other inmates in the infected houses to the detention wards at the hospital, or quarantining such inmates in the house for 14 days.

4. Thorough disinfection and redisinfection of the house, its contents, and inmates; clothing and bedding disinfected by steam. All articles that could not be thoroughly disinfected were burned.

5. The inspection of all dead bodies of Chinese.

6. The distribution of rat poison in all houses by the inspectors themselves.

7. The disposition of the dead: Cremation principally. On account of the religious prejudices of the Chinese, their dead—the coffins being filled with disinfectants and quicklime—were buried in the "plague plot."

To carry out the first provision, a house-to-house inspection was inaugurated at once. This is still continued in certain sections of the city. With the assistance of Major Tiernan, chief of police, a corps of 100 inspectors was organized within 36 hours. These inspectors were Filipinos, for the most part medical students. It was impossible to obtain soldiers for inspectors. The city was divided into 10 districts and each district into three subdistricts, and instructions and regulations written in Spanish were furnished each inspector. Ambulances and carts for carrying disinfectants were provided. This force on January 9, 1900, was turned over to Maj. Ira C. Brown, surgeon, United States Volunteers, and, under the direction of that energetic and efficient officer, did excellent service, much better than we had hoped for. No one who has not been in close touch with an Eastern city and the mode of life of its inhabitants can realize what a sanitarian has to wrestle with in this country. The density of population and the consequent overcrowding in the city is appalling, and, if it continues, is sure to bring disaster. Major Brown, in connection with his sanitary inspectors, utilized the fire department to clean a large part of the city. All drains were opened and flushed, the interiors and rears of houses were cleaned and whitewashed, and an immense amount of other work was accomplished by this officer. At the same time the regular sanitary department was doing its usual good work.

For the prompt detection of plague cases among the Chinese and the prevention of concealed cases much is due to the Chinese consul and Mr. Palanca. The latter is especially influential among his fellow-countrymen from Amoy. At his instance the Chinese merchants furnished from their own number 40 inspectors, who made daily house-to-house inspections in the Chinese districts, and I do not believe that any case of sickness escaped them. This work was continued for two months at their own expense. The Chinese also built a pest hospital for the care of their own people and have paid all of its running expenses. Acting Assistant Surgeon Le Hardy, a very energetic and capable young officer, was assigned to duty in the Chinese district, and every Chinaman dead of any disease was inspected by him. The disease has been confined almost entirely to the native and Chinese populations. Only two white men have contracted the disease. These were teamsters in the quartermaster's corral. The first of these cases was reported on the night of May 20 from one of the military hospitals as a suspicious case, and was removed to the pest hospital, where he died the next day, May 21. The autopsy and culture growths proved it to be a case of plague. The second case occurred in the bunk house of the corral on May 27. This case recovered. There were more than 400 employees in and about this corral. Two hundred and forty of them slept in one bunk house made of nipa and bamboo. Few of them paid any attention to personal hygiene, and their sanitary surroundings were miserable. Every condition except famine favorable to an outbreak of the disease among these people was present. That no outbreak did occur is due to the prompt and efficient methods adopted, which were carried out under the personal supervision and direction of Assistant Surgeon Lynch, who, here as elsewhere, proved himself to be a willing and capable officer. No infection occurred in our forces handling cases of plague, either in or out of the hospital. The opinion I have formed of plague from the experience of the past six months is, that little difficulty will be experienced in controlling it in any intelligent community with modern sanitary conditions. The board made early application to the government laboratories in Bombay for Haffkine's vaccine material. Some was obtained from the marine-hospital surgeon, who has also recently received some Yersin serum. It is almost impossible, without force, to use the Haffkine vaccination on Chinese or natives. A thorough test has not been given to either the Haffkine material or the Yersin serum, but we have not been favorably impressed with either. Dr. Calvert at a later date will make a full report on this subject, also on his work in this line.

I can not speak in too high terms of the absolute fearlessness, energy, and cheerful cooperation of every medical officer associated with me in this work, and of the faithful and efficient services of Acting Steward Thomas McL. Van Wyck and Private James F. Beahan, Hospital Corps, United States Army, who have been on duty with the board of health.

Respectfully,

GUY L. EDIE,
Major and Surgeon, U. S. V., President Board of Health.

The following papers formed appendices to Major Edie's report:

Amount of vaccine virus furnished by the board of health of Manila to the Army and Navy of the United States, and to the native inhabitants of the archipelago outside of the city of Manila, from July 1, 1899, to June 30, 1900.

Date.	Army and Navy.	Natives.	Total.
1899.			
July	6,520	700	7,220
August	3,120	3,720	6,840
September	5,230	3,100	8,330
October	6,720	4,310	11,030
November	2,830	7,070	9,900
December	5,900	2,230	8,130
1900.			
January	21,700	5,800	27,500
February	24,020	36,900	60,920
March	16,590	129,140	145,730
April	8,230	137,910	146,140
May	8,410	102,000	110,410
June	6,180	73,660	79,840
Total	115,450	506,540	621,990

Report of the number of vaccinations in Manila and suburbs, Presidio, Bilibid, and Malabon from July 1, 1899, to June 30, 1900.

Date.	Manila and suburbs.	Presidio.	Bilibid.	Malabon.	Total.
1899.					
July	9,148			4,167	13,315
August	15,023				15,023
September	8,297				8,297
October	6,159				6,159
November	5,588		783		6,371
December	4,228	318			4,546
1900.					
January	5,084				5,084
February	4,455			3,046	7,501
March	7,005			5,143	12,148
April	15,036			5,576	20,612
May	8,437				8,437
June	5,561				5,561
Total	94,021	318	783	17,932	113,054

Record of mortality by months from October, 1899, to July, 1900.

[Population estimated at from 350,000 to 600,000.]

Month.	Number of burials with permits.	Number of burials without permits.	Total number of deaths.	With medical attendance.	Without medical attendance.	Children under 5 years.	Number of deaths from— Tuberculosis.	Beriberi.	Malarial fevers.	Diarrheal diseases.
October	942	242	1,184	224	960	450	65	55	29	72
November	1,090	145	1,235	207	1,028	515	103	160	34	136
December	1,092	70	1,162	232	930	502	115	143	36	157
January	1,055		1,055	335	720	396	126	121	56	126
February	884		884	315	569	344	119	71	46	131
March	887		887	302	585	371	128	38	43	130
April	805		805	263	542	354	126	27	30	119
May	724		724	238	486	344	119	17	30	100
June	599		599	181	418	231	91	10	34	102
Total	8,078	457	8,535	2,297	6,238	3,507	992	642	338	1,073

Record of mortality by months from October, 1899, to July, 1900—Continued.

Month.	Number of deaths from—						Remarks.
	Acute lung diseases.	Typhoid fever.	Smallpox.	Bubonic plague.	Leprosy.	Measles.	
October	60	4	......	......	8	......	Chinese not being on record, 72 carried as without medical attendance.
November	100	2	1	......	6	......	Chinese not being on record, 75 carried as without medical attendance.
December	72	4	......	1	13	......	Chinese not being on record, 62 carried as without medical attendance.
January	75	2	3	11	7	2	Chinese regularly on record from January 15, 65.
February	83	6	2	35	4	1	Chinese, 80.
March	68	5	1	49	3	1	Chinese, 72.
April	61	6	......	44	1	......	Chinese, 63.
May	66	8	......	17	2	......	Chinese, 39.
June	45	4	......	11	2	......	Chinese, 35.
Total	630	41	7	168	46	4	

Record of mortality by nationality from October, 1899, to July, 1900.

[Population estimated from 350,000 to 600,000.]

Month.	Filipinos.	Spanish.	American.	Swiss.	Italian.	French.	Portuguese.	Austrian.	Chinese.	Malay.	German.	Japanese.	British Indian.	Australian.	Cuban.	Guam.	Scotch.	English.	Total.
October	930	4	2	1	...	...	...	...	4	...	...	...	...	...	...	...	...	1	942
November	1,071	6	2	...	1	1	1	...	5	2	...	...	...	...	...	...	...	1	1,090
December	1,069	14	2	...	...	...	...	1	3	...	...	...	...	...	...	...	...	3	1,092
January	974	11	3	...	...	...	...	...	65	...	1	1	...	...	...	...	...	...	1,055
February	788	13	1	...	...	1	...	...	80	...	...	...	...	...	...	...	...	1	884
March	802	10	1	...	...	...	...	...	72	...	...	...	...	...	...	...	...	2	887
April	731	6	1	...	...	...	...	...	63	...	...	...	1	1	1	...	...	1	805
May	674	4	2	...	...	...	...	...	39	...	...	...	...	...	...	...	...	5	724
June	552	8	1	...	...	...	...	...	35	...	...	...	...	...	...	1	1	1	599
Total	7,591	76	15	1	1	2	1	1	366	2	1	1	1	1	1	1	1	15	8,078

Report of cases of bubonic plague, deaths, recoveries, disinfection of houses and the placing of rat poison, from January 1 to June 30, 1900.

Month.	Whole number of cases.	Whole number of deaths.	Cases reported each month.	Cases recovered.	Number of deaths.	Number of houses disinfected.	Number of houses in which poison was placed.[1]
January	18	11	18	7	11	26	....
February	66	46	48	13	35	58	....
March	130	95	64	15	49	54	....
April	184	139	54	10	44	499	....
May	206	156	22	5	17	361	....
June	225	167	19	8	11	143	2,039
Total	829	614	225	58	167	1,141	2,039

[1] As no records were kept of the number of houses in which poison was placed, to June, it is impossible to fill out report, but the month of June can be taken as a fair average for the preceding months, as a like amount of poison had been used since January 1.

Report of cases of bubonic plague, deaths, recoveries, disinfection of houses and the placing of rat poison, from January 1 to June 30, 1900—Continued.

	Cases.	Deaths.
Natives	63	51
Chinese	160	115
Americans	2	1
Total	225	167

REPORT OF FIRST LIEUT. W. J. CALVERT, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE CASES ADMITTED INTO THE PLAGUE HOSPITAL.

MANILA, P. I., *July 13, 1900.*

SIR: In compliance with your instructions of July 2, 1900, I have the honor to make the following preliminary report:

The larger proportion of cases have been admitted to the Plague Hospital a few hours before death; a few cases, however, have been observed almost from the onset of the disease.

The period of incubation varies from at least two to ten days. Fever, headache, and oftentimes tenderness of the lymphatic glands are the first symptoms noted. The temperature rises suddenly. The course of the fever is irregular. It may be fairly regular in some cases, while in others the curve is remittent or intermittent in type. Frequently the temperature drops to normal, followed by a sudden rise to 9.5°C.–40.5°C., and death. The remittent type, closely resembling the septic type, seems to be most common.

Headache is quite constant, severe, and persistent.

The tenderness of the lymphatic glands may develop with the fever; in other cases no tenderness or enlargement of the glands can be discovered until a few hours before death.

On inspection the patient is found lying on the side, with the thighs flexed on the trunk to relieve the pain, and with the eyes turned away from the light; if lying on the back, the thighs remain flexed. None of the cases have shown any lesions of the skin peculiar to plague, except as noted in the post-mortem records. The hemorrhages, if any, develop later in the course of the disease.

The facial expression is that of intense pain, frequently mixed with anxiety and fear. The eyes, as a rule, are rather dull, but in a few cases no change in expression occurs and the eyes are bright.

The lips are usually dry and the tongue heavily coated, white, often furrowed, while the edges are clean, bright red, and œdematous.

Thus far I have seen nothing particular in the tonsils.

The thorax in all of the cases was clear, excepting a few râles, which had no particular significance. The respiration is usually rapid, shallow, and oftentimes labored.

The pulse varied, naturally, with the febrile condition of the patient, and in no case presented any peculiarity. As a rule the pulse was rapid, easily compressed, and oftentimes stringy. The heart's action is feeble.

The abdomen presented nothing of importance. One case presented pain in the right inguinal region, due to the enlarged iliac glands. The genitals showed nothing of importance.

The blood showed marked increase of polymorphonuclear leucocytes.

The patient is usually constipated and the urine scanty.

The mental condition of the patient is very variable. Frequently it is benumbed at other times the patient is semicomatose and very restless. Rarely is the patient irrational.

Vomiting is often present. It is accompanied by no pain and does not seem to indicate in any way the condition of the stomach or the severity of the disease.

The lymphatic glands enlarge rapidly. They are hard, in the early stages isolated, and freely movable. The glands of the same group rapidly become infected. The blocking of the lymph channels causes marked œdema in the tissues around the infected glands. The inflammation rapidly extends into the surrounding tissue and to the skin, forming one large, irregular, immovable mass. In some cases the skin is reddened, but in none of the cases have hemorrhages or carbuncles developed. The skin is often œdematous. Neither the time of development nor the degree of tenderness in the glands is constant. The tenderness of the glands may be among he very first symptoms observed. On the other hand, in some cases it is not noticed ntil a few hours before death. The pain is, as a rule, exquisite and the patient nvariably assumes a position in bed best suited to relieve as far as possible all pres-ure on the glands. The degree of tenderness does not seem to depend entirely on he degree of enlargement of the glands.

Thus far 25 post-mortems have been made on cadavers dead from pest. A brief ynopsis only of these will be given, as the greater part of the work can not be reported at this time.

The facial expression seen on those dead of plague is similar to that described above.

In 6 of the 25 autopsies subcutaneous hemorrhages were observed; only one however was well marked. This case presented numerous small hemorrhages on the face, upper extremities, and trunk, most marked on right side.

Owing to the frequent glandular enlargements met with in this region, the record of enlarged glands at post-mortem from pest can not be entirely relied upon per se. Only the larger glands were noted. The following records from enlarged glands gives the complete glandular enlargement. As will be seen, frequently two or more groups of enlarged glands occurred in the same subject.

In the 25 autopsies, enlarged glands were found five times in the neck, or 20 per cent; six times in the right axilla, or 24 per cent; seven times in the left axilla, or 28 per cent; sixteen times in the right inguinal and femoral region, or 48 per cent; fifteen times in the mesentery, or 60 per cent; and six times in the iliac glands, or 24 per cent. During life the glands are easily felt and oftentimes easily seen, but however large during life, at the autopsy the swelling seems to have largely diminished or entirely disappeared.

On section the tissue surrounding the glands is infiltrated with a straw-colored gelatinous serum. The extent of this infiltration varies, frequently extending over an area having a radius of 6 or 7 cm. This infiltrated tissue is often hemorrhagic, and owing to the enormous venous distension, bleeds on the slightest injury. The condition of the glands varies according to duration of the disease. In rapidly fatal cases the glands are only slightly enlarged, hemorrhagic; while in the cases of longer standing the glands are very large, hard to the touch, but on section found to be soft in the center. In 6 of the 25 autopsies, the chain of glands extending from the inguinal group into the abdomen, along the iliac group to the left side of the spinal column, were greatly enlarged and surrounded by widespread, retroperitoneal hemorrhages. In one case the hemorrhage extended throughout the entire retroperitoneal tissue. These glands seemed to be enlarged out of all proportion to the external glands.

In rapidly fatal cases the plague organism was obtained in pure culture from enlarged glands wherever found; in cases of longer standing mixed cultures were always obtained.

The peritoneal cavity and pelvis, except in the 6 cases showing enlarged retroperitoneal glands and hemorrhages, were normal, excepting an occasional punctate hemorrhage and distended venule.

The spleen in all cases was soft and of a brick-dust color. It was greatly enlarged in 18 cases, moderately enlarged in 1, practically normal in 2, and very small in 1. The weights were not taken.

The liver and kidneys were markedly congested.

The stomach when examined showed mucous gastritis with more or less punctate hemorrhages. The intestines frequently showed some enteritis with a few small hemorrhages, otherwise normal.

The heart was in all cases greatly distended, especially the right side. Subpericardial hemorrhages were noted in 13 cases. The heart muscle was pale and flabby.

The lungs in 9 cases showed subpleural hemorrhages and a varying degree of congestion and œdema in all cases; in 3 cases broncho-pneumonia was seen.

From the enlarged glands spleen and blood cover slip preparations show a short round-end bacillus, occurring singly, in pairs end to end, in chains of from four to six, and oftentimes in small clumps. These organisms take all the ordinary stains and rapidly decolorize by Gram. The poles of the bacilli often take a deeper stain than the center, frequently resembling a diplococcus.

Forty-eight-hours-old colony is small, round, even-edged, semitranslucent, and of a milky-white color; by transmitted light slightly bluish.

On neutral plain agar the organism produces a fairly abundant growth, which at twenty-four hours is semitransparent and slightly whitish; at forty-eight hours it is of a more opaque white color and of a glutinous consistency.

On glucose agar slants the growth is not so abundant as on plain agar. In stab culture no gas is produced. The growth extends along the entire stab and is of a whitish color.

On acid potato the growth is scanty, moist, and after forty-eight hours of a slightly yellowish color.

Milk is not coagulated. Litmus milk is not reddened, but old cultures are slightly paler than the original tube.

Cover-glass preparations made from culture tubes show a short, round-end bacillus, occurring singly, in pairs, and in chains of from 4 to 6 bacilli. These organisms stain by all of the ordinary stains and rapidly decolorize by Gram's stain.

House rats inoculated subcutaneously with this organism die in from thirty to sixty-five hours. At autopsy the inguinal and axillary glands are found to be enlarged, hemorrhagic, and frequently soft in the center. Cover-glass preparations made from these glands show organisms identical with those above described. The same organism is abundant in the blood. The spleen is enlarged, soft, and oftentimes hemorrhagic. Hemorrhages are found in the lungs, stomach, intestines, liver, and kidneys. All of these organs are congested. Cultures from these organs show the original organism.

Monkeys inoculated with this organism die in from seventy-two to one hundred hours. The autopsy reveals the same lesions as seen in the rats and the organism can be recovered from any of the organs. Later a detailed report will be made.

Very respectfully, your obedient servant,

W. J. Calvert,
First Lieutenant and Assistant Surgeon, U. S. A.

The President of the Board of Health,
Manila, P. I.

Lieut. W. J. Calvert, assistant surgeon, United States Army, on duty with the board of health of Manila, was sent on a special visit to certain cities in Japan and to Hongkong, China, with a view to learning the measures in use for dealing with the infection of bubonic plague. His report, dated May 24, 1900, is as follows:

I proceeded to Japan, per paragraph 7, Special Orders, 48, via United States Army transport *Sheridan*, which left Manila March 6, 1900. On arriving at Nagasaki, I proceeded by first available steamer to Yokohama and from there to Tokyo by rail. On my way back to Manila I visited Kyoto, Osaka, Kobe, and Hongkong.

On returning from his studies in Germany Dr. Kitasato established, in Toyko, a hospital for infectious and contagious diseases; a well-equipped laboratory with a library pertaining to this department of medicine, and a farm and laboratories for the preparation of antitoxins. Later the Japanese Government, recognizing the importance of this work, made it a Government institution under the supervision of Dr. Kitasato.

The hospital is of Japanese architecture and comprises all of the modern sanitary improvements, a large steam sterilizing apparatus, and a well-equipped studio for photography and microphotography. The laboratory is a large two-story frame building, in which the routine laboratory work of the hospital is carried on, and original investigations in bacteriology, pathology, and general treatment of these diseases pursued. Special investigations on the pathology and serum treatment of tuberculosis, dysentery, typhoid fever, and plague are now in progress. Dr. Kitasato's staff comprises a number of well-trained doctors. In addition, the chief officer of health of Tokyo and the chief quarantine officer of Yokohama are pursuing in this laboratory original investigations in connection with their departments. In difficult or doubtful cases these officers make the necessary examinations, leaving the ordinary routine work to their assistants. The serum farm is located in the outskirts of Tokyo. The equipment here consists of a small laboratory, stables, apparatus for handling animals, and a large lot in which the animals are allowed exercise. The serum laboratory is located in Tokyo, and is equipped with power centrifugalizers and concentrating and boiling apparatus.

A brief description of the preparation of plague antitoxin will be given. Large quantities of sterile cultures of the plague bacilli are repeatedly injected into the horse at intervals of two weeks. After from eight to twelve inoculations a small quantity of serum is prepared for experimentally testing its strength. When larger quantities of serum are desired, from 2,000 to 2,500 c. c. of blood are withdrawn from the jugular vein. The blood is then whipped, centrifugalized, and the clear serum drawn off and made a one-half per cent solution of carbolic acid. It is then ready for use. Three days after blood is withdrawn from an animal, another inoculation is made, and two weeks later blood may be again withdrawn. This cycle may be repeated as often as desired.

Thus far serum has been prepared which has a protective power, but at present is not successfully used for therapeutic purposes. It is claimed by some that when used n very large quantities, the serum reduces to some extent the mortality. Serum mixed with equal parts of sterile cultures is sometimes used to protect exposed perons. From 0.6 to 0.8 c. c. of this mixture is used for the first injection. The serum s supposed to give immediate protection while the toxin in the sterile culture is being converted into antitoxin. After the reaction has subsided from 0.8 to 1 c. c. of sterile culture is used for the second injection. Thus far plague antitoxin sufficiently strong for therapeutic use has not been made or is not generally known.

At the present time there is no plague in Japan. Suspicious cases of plague occurring on the island are immediately reported to the Institute for Infectious Diseases. If necessary Dr. Kitasato or some member of his staff visits the infected district to give any possible assistance. Patients dying of plague are buried in a separate cemetery. The cadaver is well covered with chloride of lime.

The Japanase propose to pursue the following methods in the event of another epidemic in Japan:

Situated as Japan is, sea quarantine is the only method of preventing the introduction of plague. At present their quarantine laws are most stringent and well carried out. In the event of an epidemic a strict land quarantine would be established, when all trains, etc., leaving an infected district would be inspected. If a suspected case of plague should be found, the patient and all passengers in the infected wagon would be isolated and the wagon and effects of the passengers disinfected.

The entire infected district would be quickly and thoroughly cleaned. This cleaning process would be quickly extended to surrounding and distant districts, so that in a short period of time the entire island would be in as good sanitary condition as possible. While the cleaning is in progress an attempt would be made to kill all the rats. A stated price is given for each rat brought to a designated officer.

A systematic search is made for the sick and all cases of plague or suspected plague immediately reported. The patients, their families, and immediate neighbors are immediately isolated and their houses and effects disinfected. In this way those exposed to the disease are easily watched and are allowed to return to their homes after a period sufficiently long (ten days) to insure the nondevelopment of the disease. An attempt is made to teach the general public the nature of plague, its modes of spreading, and the individual precautions to be taken. This information is given through the public press, schools, and places of worship.

Protective inoculation will probably be extensively used, more especially on those exposed to the disease. The protective power develops after from eight to ten days, and if developed from toxins is of long duration (not definitely determined). The immediate family of the patient will probably be inoculated with the mixture of serum and toxin.

The treatment of the patient will be the early extirpation of the bubo, injection of large quantities of serum, treatment of symptoms as they arise, with especial reference to the heart. A well-selected diet will be given. Extreme care of the hospital must be taken, especially with respect to illumination, ventilation, and contamination.

Plague is practically always present in Hongkong. A corps of inspectors make a house to house inspection and all cases or suspected cases of plague or other contagious or infectious diseases are immediately sent to Kennedytown Hospital. Systematic disinfection is employed in the plague-infected districts and in houses in which isolated cases of plague are found.

All cadavers found in the streets or unclaimed are sent by the police or inspectors to the mortuary, where the necessary examination and the proper disposition of the bodies are made. All plague cadavers are buried in the plague cemetery, which is on the slope beyond Kennedytown Hospital. The bodies are well covered with chloride of lime.

The mortuary is in an isolated spot on the slope near the outskirts of the city. It consists of several small brick buildings, well drained and equipped for complete post-mortem examinations.

The Kennedytown Hospital is a large substantial building situated in the extreme outskirts of the city and used for infectious and contagious diseases. Around the main building are a number of nipa wards in which plague patients are treated. The floors of these wards are built about 2 feet above a concrete pavement, enabling almost perfect cleanliness to be maintained.

In conclusion, I wish to thank Dr. Kitasato and his assistants for their courtesies so generally extended to me while in Tokyo.

MUMPS.

Of this disease there were reported in 1898 2,075 cases in the Army, regulars and volunteers, equivalent to an admission rate of 14.04 per thousand of strength. The largest rate, 48.54, was given by volunteers in the Philippine Islands. In 1899 the Army rate, volunteers and regulars, was 17.42, the largest rate being again in the Philippines, where 22.94 per thousand was recorded. No fatality occurred among these cases.

As the average annual rate for the decade 1888–1897 was only 5.63 per thousand, the increase to 14.04 in 1898 and 17.42 in 1899 shows the influence of aggregation in large camps and garrisons on the prevalence of the disease.

DIPHTHERIA.

In the Army, regulars and volunteers, 59 cases of diphtheria, with 4 deaths, were reported in 1898, and 58 cases, with 5 deaths, in 1899. The colored troops were comparatively free from this affection. No special report was rendered on this disease during the past year.

ERYSIPELAS.

A noticeable decline has taken place in the prevalence of erysipelas in our Army of late years, which may be ascribed to the progress of aseptic surgery. During the decade 1888–1897 the average annual rate of admission for erysipelas was 1.94 per thousand of strength, a rate which was reduced in 1898 to 0.64, and in 1899 to 0.84. In 1898 there were 94 cases, with 1 death; and in 1899 92 cases, with 4 deaths.

TYPHOID FEVER.

On August 18, 1898, a board of medical officers consisting of Maj. Walter Reed, surgeon, United States Army; Maj. Victor C. Vaughan, division surgeon, United States Volunteers, and Maj. Edward O. Shakespeare, brigade surgeon, United States Volunteers, was appointed to investigate into the causes of the extensive prevalence of typhoid fever in the various camps in the United States, to call the attention of the proper commanding officers to any insanitary conditions in the camps visited, and to make recommendations with a view to their prompt correction. The report of this board has lately been received and is now on file in the library of the Surgeon-General's Office, where it may be consulted by those desiring to see the original data on which the conclusions of the board are based. An abstract of the report has already been published. In expressing my high appreciation of the able and painstaking manner in which the board accomplished the task imposed upon it, I desire to express my sincere regret at the death of Major Shakespeare, which occurred shortly after he had completed his arduous labors as a member of this board.

The subject of typhoid fever in our military camps was discussed also at some length in my last annual report. It will suffice, therefore, at the present time for me to present the statistics of the Army for 1899, together with the completed statistics, including the volunteer records, for the year 1898.

In 1898 there were reported 20,926 cases, with 2,192 deaths and 44 discharges on account of disability consequent on the disease. These numbers represent an admission rate of 141.59, a death rate of 14.83, and a discharge rate of 0.30 per thousand of the mean strength. The deaths constituted 10.48 per cent of the cases, equivalent to 1 death in 9.55 cases.

The relative prevalence and mortality were greatest among the troops in Porto Rico, where the admission rate was 294.74 and the death rate 34.60 per thousand of the strength. Among these troops there were 1,678 cases, of which 197 proved fatal, the deaths constituting 11.74 per cent of the cases, or 1 death in 8.52 cases. The largest absolute number of cases was reported from the camps in the United States, 17,686 cases, of which 1,749 proved fatal, the admission rate being 143.48 and the death rate 14.19 per thousand of the mean strength. The fatal cases constituted 9.89 per cent of the total, equivalent to 1 death in 10.11 cases.

In the Army, regulars and volunteers, in 1899, 2,184 cases of typhoid fever were reported, with 258 deaths and 24 discharges on account of disability caused by the disease. These numbers are equivalent to the ratios of 20.69 admissions, 2.44 deaths, and 0.23 discharges per thousand of the mean strength. The deaths constituted 11.81 per cent of the cases, equivalent to 1 death in 8.47 cases. The rates were lowest among troops serving in the United States and highest among those in garrison in Cuba. The admission and death rates among the former were 10.85 and 1.07 per thousand of strength, and among the latter 39.40 and 4.24.

In 1898 the difference in the susceptibility of volunteers and regulars was strongly marked, the admission rate of the former having been nearly double that of the latter, 166.03, as compared with 88.56 per thousand of strength. The explanation of this lies in the fact that most of the regulars were seasoned soldiers capable of taking care of themselves under exposures and of avoiding, under the supervision of experienced officers, many of the insanitary conditions which propagated the disease among the volunteer commands. The volunteers reported 16,796 cases, with 1,738 deaths, showing a fatality of 1 case in 9.66, or a percentage of 10.35 fatal cases. The cases among the regular troops were of a similar character as to gravity, for 1 death occurred in every 9.10 cases, or 10.99 deaths in every hundred cases. The death rate per thousand of strength was only 9.74, as compared with the death rate of the volunteers 17.18, owing to the much larger number of men affected per thousand of the volunteer strength.

In 1899 the typhoid-fever rates of both regulars and volunteers became materially lowered. Among the former 1,481 cases with 180 deaths were reported, equivalent to the respective rates of 22.98 and 2.79 per thousand of strength. The fatal cases constituted 12.15 per cent of the total number of cases, equivalent to 1 death in 8.23 cases. Among the latter 703 cases with 78 deaths were reported, equivalent to the respective rates of 17.10 and 1.90 per thousand of strength. The fatal cases constituted 11.10 per cent of the total number of cases, equivalent to one death in 9.01 cases. This somewhat greater prevalence of typhoid fever among the regulars is explained by the recruitment of these troops to 65,000 men and the prompt shipment of these recruits to join their regiments, most of which were on active foreign service, while the United States Volunteer regiments which were raised later in the year, passed a considerable time in well-constructed and equipped camps of organization before embarking for service in the

Philippines. The relative freedom of both regulars and volunteers during this year, as compared with 1898, must be ascribed to the care exercised in securing purity of water supply, removal of excreta, and thorough cleanliness of the camps and their surroundings.

According to the records, the colored troops were much less liable to become affected with typhoid fever than the white troops, but when attacked the colored men succumbed more readily to the disease. The following tabulation compares the admission and death rates per thousand of strength of the two races during the years 1898 and 1899:

Year.	White.		Colored.	
	Admission rate.	Death rate.	Admission rate.	Death rate.
1898	147.58	15.26	27.97	6.70
1899	21.77	2.52	5.35	1.30

In 1898 the fatal cases constituted 24.15 and in 1899 24.32 per cent of the total cases among the colored men, while the respective percentages among the white troops were only 10.34 and 11.60.

Since the close of the calendar year 1899 two outbreaks of typhoid fever have been reported. The first occurred in March, 1900, among troops stationed at Paete, Laguna Province, Luzon. Two companies of the Forty-second Infantry were stationed at this place, a town of 2,000 inhabitants, situated half a mile from the shore of the lake on a gently sloping bench backed by abrupt hills rising to a height of 1,500 feet. Sixteen patients with diagnosis of malarial fever, diarrhea, and dysentery were sent from this garrison to the division hospital at Calamba. Maj. George H. Penrose, surgeon, United States Volunteers, in charge of the hospital, suspected the presence of typhoid infection in these cases, and Lieut. R. P. Strong, assistant surgeon, United States Army, was sent from Manila to investigate and report. Of the 16 cases, 13 gave a positive reaction by the Widal test. The division surgeon, Maj. H. S. T. Harris, surgeon, United States Volunteers, inspected the sanitary conditions and found the garrison using water from springs in the vicinity of the houses occupied as quarters. These springs were merely the seepage from the branches of a stream which flowed through the town and received all sewage and surface filth. When the town was first occupied the commanding officer, on the recommendation of the surgeon, issued an order prohibiting the use of the water of this stream below a certain point in its course, but this order was said to have been disregarded repeatedly, especially by the members of Company H, Forty-second Infantry, from which came 11 of the 13 cases of undoubted typhoid transferred to the Calamba hospital. By direction of the chief surgeon, Major Harris took with him to Paete two Waterhouse-Forbes sterilizers and orders were issued that no other than sterilized water should be used for cooking or drinking. Four more cases occurred before the epidemic was suppressed.

The second outbreak, in which 54 cases were reported, occurred in the Twenty-sixth Infantry Volunteers, after the arrival of the regiment in the Department of the Visayas and its distribution at various stations on the island of Panay. This command, it is understood, brought the disease from the United States, but the chief surgeon considers it likely that some of the cases may have originated in the department, as typhoid fever is common among the natives, and a few poradic cases appeared in detachments of troops which had not been ssociated with this particular regiment. The cases were sent for reatment to the hospital at Iloilo, and the measures taken to suppress he spread of the infection appear to have been successful.

Concerning the medical history of this regiment the surgeon, Maj. Charles F. Mason, United States Volunteers, reported, under date June 30, 1900, from Jaro, Panay, P. I.:

> The regiment was organized at Plattsburg Barracks, N. Y. The first recruits arrived July 15, 1899, the organization of the regiment being complete August 2, 1899. All recruits were reexamined by the regimental medical officers as soon as hey joined, a total of 1,597 men being thus reexamined, of whom 197 were discharged as not coming up to the high physical standard required. The troops were quartered in the fine new barracks of the post, and, although somewhat overcrowded, were under good sanitary conditions; nevertheless typhoid fever developed, and the regiment has never been quite free from it since. The first case occurred August 17, 1899, and, like the others developed at that post, is believed to have been due to an infected water supply, that of the post being the same as that of the town of Plattsburg, where there were a number of cases in families using the city water. Even the thirty days' trip across the ocean did not get rid of the infection, 4 cases having developed on the steamer. Up to date there have been 49 cases, with 7 deaths and 5 cases remaining in hospital. In this connection it should be mentioned that typhoid fever, according to the native physicians, is endemic in this island.
>
> The regiment left Plattsburg Barracks September 5, 1899, and reached San Francisco September 17, going out to the model camp for eight days, and sailing for the Philippines September 25, arrived at Manila October 24 and at Iloilo, where it first disembarked, October 27, 1899.

Second attacks.—In eight of the reported cases of typhoid fever the patients, according to the records, suffered from a second attack. In one of these, however—that of J. G., Fifteenth Minnesota—the soldier was on sick report for so short a time during the first attack that this alone throws doubt on the diagnosis. In two—the cases of F. C., First Nebraska, and C. B., Thirty-fifth Michigan—the interval between the attacks was so slight that they may be regarded as cases of recrudescence rather than cases of a recurrence of the disease in the form of a second attack. Singularly enough, in the five other cases reported the patients belonged to the same regiment—the Forty-ninth Iowa—and each had his first attack at Jacksonville, Fla., and his second during the local outbreak of typhoid in that regiment while in camp near Havana, Cuba. This naturally suggests a doubt as to the specific enteric character of the first attack.

The following is a brief abstract of the eight cases as carded from the monthly reports of the various organizations and hospitals. It is to be understood that the diagnosis on each of these reports is typhoid fever:

> I. J. G., Company F, Fifteenth Minnesota, was taken on sick report at Camp Ramsey, Minn., August 26, 1898; to duty September 8.
>
> He was again taken on the regimental sick report November 30, and sent to the First Division hospital, Second Army Corps, Camp Mackenzie, Ga., on December 7, whence he was furloughed on January 27, 1899.
>
> II. F. C., Company C, First Nebraska, was taken into regimental hospital July 3, 1898; transferred to the reserve hospital at Cavite, P. I., July 20; returned to duty August 17.
>
> He was again taken on sick report September 20 and transferred to the transport *Rio de Janeiro*, which brought him to the field hospital of the Provisional Division of the Eighth Army Corps at the Presidio of San Francisco, Cal., from which he was returned to duty on November 11, 1898.
>
> III. C. B., Company E, Thirty-fifth Michigan, was taken into regimental hospital October 16, 1898; sent to the First Division hospital, Second Army Corps, Camp

Meade, Pa., October 22, and to civil hospital, Pottsville, Pa., October 23, whence he was returned to duty November 27.

On December 6, 1898, he was again received into regimental hospital, and on the 28th was sent to the First Division hospital, Second Army Corps at Camp Mackenzie, Ga., whence he was returned to duty March 22, 1899.

IV. J. A., Company K, Forty-ninth Iowa, was taken on regimental sick report August 20, 1898, and sent to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., on the same day, from which he was returned to duty September 22.

He was again taken on the regimental report February 17, 1899, and was transferred March 5 to the Second Division hospital, Seventh Army Corps, Havana, Cuba, where he died March 18.

V. N. F., Company A, Forty-ninth Iowa, was taken on regimental sick report August 22, 1898, and on the same day was transferred to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., from which he was returned to duty on September 8.

His name again appears on the regimental report as taken sick March 29, 1899, and transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, April 1, where he was mustered out July 7, 1899.

VI. W. E., Company D, Forty-ninth Iowa, was received into regimental hospital September 3, 1898, and transferred to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., September 8, whence he was furloughed October 11.

He was again taken on regimental report March 2, 1899; was transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, March 9, from which he was shipped April 6 on the hospital steamer *Missouri* and received into the Josiah Simpson general hospital, Fort Monroe, Va., April 13. He was returned to duty May 3.

VII. P. B., Company B, Forty-ninth Iowa. In regimental hospital September 29, 1898; to Second Division hospital, Seventh Army Corps, Jacksonville, Fla., October 4; to the general hospital, Fort Myer, Va., October 21; returned to duty November 25.

Taken again into regimental hospital, Cuba, March 14, 1899; transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, March 15; placed on the hospital steamer *Missouri* April 5; received into the Josiah Simpson general hospital, Fort Monroe, Va, April 13, where he was mustered out May 17.

VIII. S. M., Company F, Forty-ninth Iowa. In regimental hospital October 5, 1898; to Second Division hospital, Seventh Army Corps, Jacksonville, Fla., October 11; to the general hospital, Fort Myer, Va., October 21; returned to duty November 25.

Again on the regimental sick list March 15, 1899; to the hospital steamer *Missouri*, Cuba, April 5; to the Josiah Simpson general hospital, Fort Monroe, Va., April 13; returned to duty May 3.

MALTA FEVER.

In my last annual report, page 286, attention was called to a case of Malta fever, reported July 14, 1899, by Lieut. Walter Cox, assistant surgeon, United States Army, San Juan, P. R. Since then 2 cases were reported by Lieut. W. P. Chamberlain, assistant surgeon, United States Army, while on duty on the hospital ship *Relief* at Manila, P. I. These two men lay on adjacent beds for several weeks. The temperature was neither markedly remittent nor conspicuously undulating, and the original opinion of an irregular form of malaria might have been retained, notwithstanding the failure of the therapeutic test, but for the application of the serum reaction at the laboratory of the First Reserve hospital. Both cases were mild, and suggest little of therapeutic value other than the futility of using quinine in this disease. The study of such cases may throw some light on the etiology of obscure tropical fevers of mild symptomatology, which do not behave like typhoid and do not yield to quinine or show plasmodia in the blood.

In a communication dated January 2, 1900, Acting Asst. Surg. J. J. Curry, assistant pathologist at the First Reserve hospital, called attenn to the probable existence of many cases of Malta fever among the ops in the Philippines. He stated that—

> . Some time ago Dr. Strong, the pathologist, performed an autopsy on a man who d died after a continued fever of long duration. Post-mortem examination was gative as to typhoid and to malarial fever. From the cultures of this case was ained an organism identical with the coccus melitensis (the causative agent of lta fever). This organism was inoculated into monkeys and produced the typical mptoms of Malta fever. Autopsy on the animals inoculated showed typical lesions, th the development of the same coccus, which in turn produced the same disease other animals. Dr. Strong in some manner inoculated himself during these vestigations, and has now Malta fever.
>
> . At a post-mortem examination on a case received from the Second Reserve hos- al December 27, 1899, a similar condition was met with as in Dr. Strong's case— e., no typhoid, malaria, or other recognized pathological condition. Cultures from is case showed the coccus melitensis.
>
> 3. A case of continued fever in the officer's ward of the hospital, whose blood was gative repeatedly to malaria and typhoid, gave the reaction with the melitensis.
>
> 4. A case on the hospital ship *Relief*, whose blood gave negative results as above, so reacted with the melitensis.
>
> As the result of the investigations of Dr. Strong, showing the first case to be one undoubted Malta fever, the second case being also one of undoubted Malta fever, d the positive results of the blood serum reaction of the third and fourth cases, have evidence that Malta fever prevails here to a considerable extent. It is obable that many of those cases of continued fever which fail to react to Widal's st for typhoid, and which are negative to malaria, are cases of Malta fever. There e a number of such cases in the hospital at the present time, and no doubt the same true of the other hospitals.
>
> I will start at once the blood examination for Malta fever on all such cases in the spital. This will mean considerable strain on the laboratory department, which, the present time, owing to Dr. Strong's illness, is behind in its work. I would, erefore, respectfully suggest that a medical officer with some experience in labora- ry work be detailed to assist.

YELLOW FEVER.

During the year 1898 1,169 cases were reported, of which 144 proved tal, a percentage of 12.32, or 1 death in 8.12 cases. (Six cases, fatal, occurred in the Signal Corps, the strength of which could not distributed by localities for want of the necessary data.) Two cases, either fatal, occurred in Porto Rico; 33 with 4 deaths, in the United tates, and the remaining cases in the island of Cuba. The cases con- ituted 7.91 per thousand of the strength of the Army, and the deaths .97 per thousand.

During this year there were reported in Cuba 896 cases and 103 eaths among the white troops, equal to the respective rates of 132.58 nd 15.24 per thousand of the strength in Cuba, and among the colored roops 232 cases and 36 deaths, equal to the respective rates of 146.19 nd 22.68 per thousand men. The larger rates of the colored troops ave already been explained on page 81. The fatal cases among these roops constituted 15.52 per cent of their total number of cases, or 1 eath in 6.44 cases, while among the white troops the fatal cases ormed only 11.50 per cent of the total number stricken, or 1 death in .90 cases.

During the year 1899 there occurred among our troops, regulars nd volunteers, 262 cases of yellow fever with 55 deaths, the fatal ases constituting 20.99 per cent of the total number, equivalent to 1 eath in 4.76 cases. (One fatal case occurred in the Signal Corps.) ourteen of the cases, with 3 deaths, were reported from the United tates, the others from Cuba. The cases constituted 2.48 per thou- and of the strength of the Army, and the deaths 0.52 per thousand.

During this year there were in Cuba 239 cases with 50 deaths among over 18,000 white troops, and only 8 cases with 1 death among over 2,000 colored troops. The admission rates were for the whites 13.26 and for the colored 3.95, while the death rates were for the whites 2.77 and for the colored only 0.49 per thousand of men.

In addition to the outbreaks of yellow fever mentioned under the heading, "Division of Cuba," supra page 168, this disease appeared during the year at Key West, Fla. Rumors of the existence of yellow fever among the citizens of Key West were current in the barracks during the month of August, but these were declared by the health officer to be erroneous until August 31, when he announced officially the existence of 4 unmistakable cases. The post was immediately placed in strict isolation, and arrangements were made for the transfer of the garrison to Fort Terry, Plum Island, near New London, Conn. Embarkation was effected and the troops, 195 officers and men, sailed on the *San Marcos*, of the Mallory line, on September 6. They arrived on the 11th at the New York quarantine, where their baggage was disinfected, and on the 13th they were transferred on the steamer *Meigs* to their new station. Much credit is given to Acting Asst. Surg. R. C. Eve for his earnest work and successful management at this time. Two weeks after the removal from Key West Barracks yellow fever appeared in the detachment of 1 officer and 23 men which had been left behind, and 12 cases, 1 of which proved fatal, were reported from this command.

Several instances of the occurrence of yellow fever on transports were recorded during the year, but in none of these was there any spread of the disease. Thus on the transport *Ingalls*, at Havana, Cuba, a case was discovered at sick call, September 4, 1899, in the person of an electrician. The patient was removed to Las Animas hospital, where he died five days later. On the morning of September 9 symptoms of the disease were developed in a fireman, who also was sent to hospital, where he recovered at the end of five days. The disease in both cases was evidently derived from Havana. The ship was carefully disinfected and no other case occurred.

A case was discovered on the transport *Burnside* on the evening of the day of sailing from Havana, Cuba, November 24, 1899.

Early in November 2 cases were found on the transport *Wright* at Santiago, Cuba. They were immediately transferred to hospital on shore. The ship was disinfected and held in quarantine for five days, after which she proceeded on her voyage.

The transport *McClellan* sailed from Santiago, Cuba, December 23, 1899, and arrived at Brooklyn, N. Y., on the 29th. Immediately after sailing, a sailor, who had been for a week ashore in the city of Santiago, was taken sick with an unmistakable attack of yellow fever. He was placed in absolute isolation, with a special nurse. The visits of the surgeon were made in pajamas and rubber gloves, which were left inside of the outer door of the sick room, and were afterwards soaked in bichloride solution. The patient died on the 27th. The body was removed in sheets soaked in bichloride solution, and was buried at sea. Bed linen and blankets were soaked in a similar solution, and the ward was washed with a strength of 1:500, and afterwards fumigated with sulphur. On arrival at the New York quarantine station the bedding of the hospital and of the hospital corps quarters was disinfected, and the ship again treated with bichloride and fumigation. No other case occurred.

ON THE TREATMENT OF YELLOW FEVER, BY ACTING ASST. SURG. BAT SMITH, YELLOW FEVER HOSPITAL, SANTIAGO BAY, CUBA, SEPTEMBER 19, 1899.

Owing to some controversies which have occurred of late relative to the treatment of yellow fever during this epidemic, I deem it my duty to submit to the chief surgeon my personal views on the subject, as the great majority of the patients treated at this hospital were under my sole care.

A treatment inaugurated by Acting Asst. Surg. E. F. Nunez,[1] and which I said in a former communication deserves due consideration, has found favor with some of the medical officers of this department. The main feature in this treatment seems to be the doctor's great reliance upon and faith in the therapeutical value of salol, with occasional doses of cream of tartar water acidulated with a little lime juice; also irrigation of the bowels with warm water. Lemonade, hot or cold, is also given according to the necessities of the case. Dr. Nunez argues that salol acts as an antiseptic, rendering the stools absolutely odorless. He further argues that by reason of its antiseptic properties it calms the irritation of the stomach and bowels, and thereby reduces the temperature. Cream of tartar acts upon the kidneys and keeps the bowels open.

I watched the results of this treatment with keen interest, sincerely trusting that the doctor's sanguine expectations would be realized, yet I had serious misgivings on account of the nature and composition of the drug salol.

The fact seems to have been overlooked that salol is an irritant to the mucous membranes. It is not soluble in water, and but very slightly soluble in the stomach, but is decomposed by the pancreatic juice into salicylic acid and carbolic acid, the drug being a composition of salicylic acid 60, carbolic acid 40, the antiseptic virtues of the compound being, in all probability, due more to the latter than to the former ingredient. The drug when used in moderate doses evidently has a beneficial effect in soothing the pain in the bowels, which is present in the great majority of cases. The beneficial results obtained by these moderate doses are, on the other hand, more than counterbalanced by the poisonous action of the drug when given so persistently, and in such doses as were administered to the patients during this epidemic regardless of the fact that poisoning by carbolic acid would certainly occur, owing to the decomposition of the drug by the pancreatic juice into its two original ingredients.

According to the best of the European as well as American investigators, the drug is contraindicated in renal inflammation. Especially in the acute form, Lepine and Dujardin Beaumetz condemn the administration of the salicylates in any form when albumen is present. Hesselbach maintains that salol is prone to affect the secreting structure of the kidneys, and deems it exceedingly dangerous when the kidney is diseased. He reports in the Lancet two fatal cases from the use of salol.

If salol be given in doses sufficient to reduce the temperature its poisonous effects are plainly manifest, such as intense headache, restlessness, a profuse and exhausting sweat, delirium; in some cases the mental disturbance lasts for several days, the albumen in the urine increases, and the urine assumes a dark olive-green color. These symptoms were well marked in several cases at this hospital, and two patients had strong and frequent epileptiform convulsions. Again salol has a depressing influence on the circulation, and in yellow fever capillary stagnation is a well-marked feature; while the direct depression of the heart itself decreases the force of the circulation. In this latter view of the action of salol, I am sustained by Kolbe, Danewsky, and Hesselbach. After salol has been administered for any length of time the urine becomes of a dark reddish-brown color, and when nitric acid is added to it the albumen changes to a yellowish-green color; this I have seen mistaken for bile, when in fact it was due to the union of carbolic acid and nitric acid, forming picric acid (bile absent in yellow fever). Salol given in decided doses, whether in yellow fever or any other disease where the kidneys are the seat of an inflammatory process, is prone to bring about renal hemorrhages, and sometimes hemorrhagic cystitis. Considering the decomposition of the drug into its two original ingredients, salicylic and carbolic acids, and the poisonous properties of the two acids, either alone or together, their pernicious action in irritating an already inflamed kidney, bringing about total suppression of urine, the most fatal of all the symptoms in yellow fever, would certainly lead me to believe the drug to be contraindicated in this disease.

Some cases of yellow fever recovered under the salol treatment. They were, however, of a mild type, and would in all probability have passed through the ordeal with little medication, the disease being a self-limited fever. The records of this hospital show that the treatment of severe cases with salol was anything but satisfactory. In this statement I am fully sustained by the commanding officer, Acting Asst. Surg. G. A. McHenry, and by the nurses who administered the medicine.

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[1] See Annual Report of the Surgeon General of the Army, June 30, 1899, p. 264.

When put in charge of the wards of this hospital, on June 16, 1899, the commanding officer asked me if I had any particular treatment marked out. I outlined to him, as nearly as possible, my line of treatment; he expressed himself as satisfied, saying that it was identical with that of his friend Surgeon Murray, of the Marine-Hospital Service, whose long experience with the disease certainly entitles his opinion to consideration. The treatment in the majority of cases was as follows: If the patient's condition was such as to permit it, I usually gave him calomel combined with soda, a hot mustard footbath, and a warm sponge bath from head to foot, also an irrigation of the bowels with warm water, after which the patient was covered up in bed, but not too heavily; sometimes a warm lemonade was given to promote the perspiration. If the temperature is high half an hour after giving the calomel and soda, I give the patient about ten grains of phenacetine combined with citrate of caffeine, to be repeated according to the necessities of the case. Phenacetine is a coal tar product, produced by the action of glacial acetic acid on paraphenetidin, a body obtained from phenol. Experiments go to prove that the fall of the temperature produced by phenacetine is due to a lessened production of animal heat caused by a direct influence of the drug upon the thermogenetic centers, not necessarily accompanied by any distinct alteration of the circulation. By stimulating the heart (when full therapeutical doses are given) and the vasomotor system, the arterial pressure is increased, and the capillary stagnation, which is so pronounced in yellow fever, is partially overcome. Owing to its analgesic properties, phenacetine is a very useful remedy in relieving the intense frontal headache. Its antipyretic effect or rather action is more gradual, more prolonged, and less apt to be attended with disagreeable symptoms than any drug of its class. It does not irritate the stomach and is the safest and most efficient of the coal-tar derivatives. Lepine and Guttman place it at the head of the list. By combining phenacetine with caffeine citrate, phenacetine is placed in the citric-acid group, which renders it less poisonous still.

The combination is made because caffeine stimulates the brain, giving an increase to the urinary secretion and force to the pulse, and elevates the arterial pressure. It is a cardiac stimulant and prevents heart failure; it takes the place of digitalis, which can not be used in yellow fever. It never disagrees with the stomach and acts with promptness; by reason of its action upon the kidneys it in a great measure guards against suppression of urine. There is no danger of the patient's being poisoned by carbolic acid, however large the dose of phenacetine may be, as it contains no phenol, and whatever depressing influence the drug may have is more than counterbalanced by the stimulating properties of the caffeine citrate.

I have always caused the patients to be sponged off at least twice a day with hot water, and the bowels to be irrigated with warm water morning and evening. This relieves the pain and uneasy feeling in the bowels, permitting the patient to rest more easily. Should symptoms of uremic poisoning set in, or the urine become scant, I order a hot bath at once, immersing the patient up to his neck in the water (this year I used half sea and half fresh water) allowing him to remain in the bath for about fifteen minutes, after which he is taken out and wrapped in dry blankets and one-half teacupful of green coffee tea and one ounce of gin is given. This has the effect of causing a profuse perspiration, and in many cases a copious flow of urine was obtained, even after the action of the kidneys had been suppressed. The green coffee tea was suggested to me by acting Asst. Surg. G. A. McHenry, who states that the remedy is extensively used on the Gulf coast, being a favorite one of Surgeon Murray's. As to drinks, some stomachs bear cold drinks well; in other cases, however, warm drinks are more suitable. Under no circumstances, however, should the stomach be overburdened with liquids, hot or cold; whatever is given to the patient should be given in moderate quantities. As to nourishment, if the patient can possibly hold out I give none at all, but if obliged to do so rice water has always been my favorite. Milk will not do, as it is apt to curdle on the stomach and do more harm than good. Many native physicians (Cubans) overburden the stomach with sweet milk; the result is at times an uncontrollable vomiting.

Black vomit I have always (when at all) controlled more easily with the subnitrate of bismuth than with any other remedy at my command, the only difficulty being that the doses generally used are not large enough. In administering this drug to check black vomit, or when it is threatened, not less than one and a-half drachms should be given at a dose, repeated if necessary according to the judgment of the attending physician.

In the stage of convalescence the usual remedies, such as the bitter tonics, wines, etc., may be used. I have always found that milk punches, eggnogs, etc., are of great benefit after the fall of the fever. The fever is a very exhausting one and the patient's vitality is much impaired. Alcohol is a negative article of food, insomuch as it prevents oxidation, and if it does not increase the patient's strength, at least it prevents waste.

Remarks on the above by Acting Asst. Surg. Edward F. Nunez.—Acting Asst. Surg. Bat Smith is fully aware that my report on the treatment of yellow fever by salol and bitartrate of potassium and my conclusions drawn from same have been abundantly proven by clinical experience.

The combination of the cream of tartar and lime juice with the salol prevents the irritating action of the latter drug on the intestinal canal and the kindeys, and consequently does away with the contraindications that the doctor sustains. It is possible that salol acts in this disease by neutralizing the specific toxine produced by its micro-organism, and thereby counteracting its pathogenic influence on the general system, or else in some unknown way we can not yet explain any more than we can say how mercury brings about the cure of syphilis.

I can assure Dr. Smith that salol has never given rise to intoxication or even any disagreeable after effects in my hands. Is he sure that the convulsions he witnessed in his two cases were not due to uremic poisoning?

The presence of bile in yellow fever is admitted by every ancient and modern writer on this disease, as it can generally be found in all the secretions. To it, as well as to some oxidation product of the coloring matter of the blood, is due the jaundice that characterizes this affection. It is only absent in an advanced stage where the fatty changes have completely obliterated the hepatic cells. Nitric acid will readily detect the presence of bile in the urine by imparting to it a green color.

I can not understand why the doctor criticises the Cuban physicians on the administration of milk during the second stage of yellow fever, since it is almost universally considered as the most eligible article of food in this particular disease, not only on account of its nutritious properties, but also by virtue of its diuretic and soothing effects on the kidneys. I never knew that any Cuban colleague ever recommended sweetened milk in this disease as he asserts. They generally give it mixed with a certain proportion of vichy or Apollinaris water, or diluted one-third or one-half with sterilized water in order to prevent heavy curdling.

Remarks by Maj. W. C. Gorgas, acting chief surgeon, Division of Cuba.—As a member of the yellow-fever commission for the Department of Havana, I have had to see nearly every case of yellow fever that has occurred in this department since January 1, 1899, and in this way have seen the treatment of every physician who has treated yellow fever here this year.

I have seen the phenacetine and caffeine treatment referred to used excessively by one physician. He got no better results than others, and as a consequence I look upon this course with disfavor.

I do not believe that any particular medicine should be urged for any particular symptom.

The tendency of most American physicians and many of the Cubans is toward constant dosing, which I am convinced does a great deal of harm.

From a very extensive experience in the observation of the practice of the best element of the native physicians, I am convinced that the best results are obtained by not using drugs to any great extent for combating the various symptoms.

I do not believe that either of the courses referred to in this paper are the best to be adopted in this disease, and would personally look upon them as being hurtful.

CEREBRO-SPINAL MENINGITIS.

It is doubtful whether all the cases of cerebro-spinal meningitis which occurred in the Army were recorded as such. In 1898, when typhoid fever was epidemic in so many of the camps, some cases of cerebro-spinal meningitis, unless strongly marked in their clinical characteristics, would probably have been recorded as cases of the prevailing disease. During this year there were reported from the Army, regulars and volunteers, 140 cases, with 79 deaths and 9 discharges for disability, and in 1899, 64 cases, with 41 deaths and 3 discharges, giving a total of 204 cases, with 120 deaths. The percentage of fatal cases was therefore 58.8, equivalent to 1 death in 1.7 cases. No special report on this disease was rendered during the past year.

MALARIAL INFECTIONS.

During the two years, 1898 and 1899, 151,021 cases of malarial disease were reported, with 443 deaths and 179 discharges for disability. The cases constituted nearly 30 per cent of the total number of cases of disease reported—506,018. Intermittent fevers formed 67.8 per cent of the whole number of malarial cases; remittent or continued malarial fevers, 28.3 per cent; pernicious fevers, 0.4 per cent, and cases of malaria cachexia, 3.5 per cent. Of the deaths, 9 were ascribed to intermittent fevers, 151 to remittent or continued malarial fevers, 243 to pernicious fever, and 40 to malarial cachexia. One case in every 844 malarial cases ended in discharge for disability, and 1 in every 341 terminated fatally. Of the cases recorded as intermittents only 1 case in 11,378 had a fatal ending; of the remittent or continued fevers, 1 case in 283; of the pernicious fevers, 37.8 per cent, or 1 case in 2.64 cases, and of the cachexia cases 1 case in every 130 cases.

The admission rate for the Army, regulars and volunteers, in 1898 was 611.78, and in 1899, 574.41 per thousand of strength. In Cuba in 1898 this rate was 1,924.74, or 61.1 per cent of the total number of cases of all diseases taken on the sick report. In 1899 the malarial admission rate among troops in Cuba fell to 1,098.46 per thousand men, or 43.3 per cent of the total number of cases of disease.

In the Army, regulars and volunteers, in 1898, 349 deaths and 63 discharges for disability were occasioned by malarial diseases, giving the respective rates of 2.36 and 0.43 per thousand of strength. This high death rate was due to the gravity of the cases in Cuba, where 14.02 died per thousand of the troops operating on the island. In 1899, 94 deaths and 116 discharges gave the respective rates of 0.89 and 1.10 per thousand of strength, the death rate in Cuba having fallen to 2.50. In the Philippine Islands in 1898 the admission rate was 424.55, and the death rate 1.51 per thousand, and in 1899 these rates were 624.37 and 0.89.

The admission rate among the colored troops in 1898 was 1,086.62, and in 1899, 557.10. The high rate during the former year has already been explained (see p. 81).

From the following tabulation of the admission and death rates the character of the cases reported during the two years may be gathered:

1898—REGULARS AND VOLUNTEERS.

	Army.		In Cuba.		In Porto Rico.		In the Philippines.		In the United States.	
	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.
Malarial fever:										
Intermittent	413.67	0.06	1,424.44	0.24	440.89	......	156.25	......	365.35	0.06
Remittent or continued	172.98	.91	432.00	5.75	315.83	1.93	265.47	1.21	141.42	.52
Pernicious	3.33	1.25	22.69	7.55	2.63	1.93	.50	.30	2.18	.85
Cachexia	21.80	.14	45.65	.48	13.00	......	2.32	......	22.23	.13
Total malarial	611.78	2.36	1,924.78	14.02	772.35	3.86	424.54	1.51	531.18	1.56

1899—REGULARS AND VOLUNTEERS.

Malarial fever:										
Intermittent	391.15	......	729.94	......	345.85	......	388.82	......	237.84	......
Remittent or continued	162.98	0.15	332.51	0.25	100.62	......	216.45	0.20	38.37	0.07
Pernicious	1.42	.55	3.94	1.75	1.07	......	1.15	.46	.50	.12
Cachexia	18.86	.19	32.07	.50	11.00	......	17.95	.23	14.17	.02
Total malarial	574.41	.89	1,098.46	2.50	458.54	......	624.37	.89	290.88	.21

By way of comparison reference may be made on the one hand to the malarial rates of the civil war and on the other to those of the ten years of peace preceding the outbreak of the Spanish-American war. The mean annual admission rate of the white troops of the United States Army during the years of the civil war was 539.77 per thousand of strength with a death rate of 3.92 per thousand. The highest rates were reported for the fiscal year 1865–66 when the admission rate was 886.63 and the death rate 6.27.

The mean annual rates of the ten years of peace, 1888–1897, inclusive were: Admission rate, 87.19; death rate, 0.13.

Few special reports on malarial diseases and their treatment have been received during the year, but in some general reports the subject is discussed incidentally. See for instance, Captain Fauntleroy's report, page 131, and that of Major Hoyt, page 148.

The following special report is submitted:

TWELVE MONTHS' OBSERVATION OF CUBAN MALARIAL FEVERS IN PINAR DEL RIO PROVINCE, BY ACTING ASST. SURG. THOMAS W. JACKSON, UNITED STATES ARMY.

Following the summer campaign of 1898 hundreds of cases of Cuban malarial fever were sent to the hospitals of the great cities of the United States and were there investigated, classified, and studied by clinicians provided with facilities which were necessarily absent from the field hospitals during the campaign. That this material was well utilized for the instruction of students and the medical profession is well known. From the date of formal American occupation, however, the military hospitals in Cuba have been fully able to utilize for the benefit of the medical profession the wealth of material which this tropical country provides.

During the twelve months covered by my observations and those of my colleagues there were treated in the military hospital at Pinar del Rio 1,904 cases of malarial fever. It has been my privilege to examine microscopically over 500 specimens of malarial blood. Every medical officer at this station has had at least one attack of malarial fever, in every case of the æstivo-autumnal variety, in his own person. The excellent literature upon the subject of malarial fevers provided by the Medical Department of the Army has been of untold value to us all in our observations. Particularly valuable have been the classical lectures of Thayer, and the writings of Manson, Cabot, and others. To Capt. G. C. Godfrey, assistant surgeon, and to Drs. William Alden and J. F. Presnell, acting assistant surgeons, I am indebted for courtesy and valuable assistance, and for permission to refer to their cases. The recorded facts and statistics cover the period from February 1, 1899, to February 1, 1900.

My personal observation of Cuban malarial fever began February 20, 1899, at Pinar del Rio, Cuba, at which place all the cases referred to in this paper occurred. The cases were confined to American soldiers, officers, and enlisted men, and civilians attached to the army stationed at this post. The commands stationed here during the dates covered included two battalions of the First Infantry, one squadron of the Seventh Cavalry, one battalion of the Third United States Volunteer Engineers, a company of the United States Volunteer Signal Corps, and a detachment of the Hospital Corps. The service of the cavalry, infantry, and hospital corps troops has been continuous; that of the engineer battalion and the Signal Corps company was confined to the months of February, March, April, and May. Civilian employees of the Quartermaster's Department, engaged in erecting Government buildings, and members of the pack train have been included as soldiers.

Of these commands one only, the First Infantry, took part in the Cuban campaign in the summer of 1898. The infantry, Signal Corps, and Hospital Corps arrived in Cuba in December, 1898, the cavalry in January, and the engineers in February, 1899. In the case of no command, save the infantry, had there been previous exposure to malarial infection. The stations of the cavalry squadron during 1898, previous to its arrival in Cuba in January, 1899, were in Arizona, Huntsville, Ala., and Macon, Ga.; at none of these places did malarial fever invade their camp. The stations of the engineer battalion following its organization at Jefferson Barracks, Mo., in the early summer of 1898 were Lexington, Ky., and Macon, Ga., the latter a winter camp. This command did not suffer from malarial fever to any appreciable extent previous to its arrival in Cuba in February. The Hospital Corps detachment was made up of men previously stationed at Camp Meade, Pa., and Augusta, Ga., and was free from malarial disease up to the time of entering Cuba. Although the First Infantry undoubtedly brought with it cases of Cuban infection dating back to the Santiago campaign, the regiment was so renovated by recruits and the discharge of men enlisted for the war only that I am of the opinion that less than 10 per cent of the cases of malarial disease which occurred in Pinar del Rio were cases of recurrence due to infection during the Santiago campaign. Of the recurrent Santiago infections the prevailing type was tertian intermittent, and the subjects often referred to a tendency of these attacks to recur after periods of twenty-one or twenty-eight days (or other multiple of seven days). This observation my colleagues and myself are inclined to believe correct. During the intervals the subjects appear to enjoy reasonably good health, and are able to perform their duties.

In my own person I observed the reappearance of æstivo-autumnal parasites in my blood, twenty-eight days after the onset of an attack of remittent fever lasting one week. Upon this occasion the temperature did not reach 100° F., but the presence of parasites persisted for some time in spite of quinine. Following this attack there occurred three outbreaks of the disease with an interim of seven days between attacks. In each outbreak the diagnosis was confirmed microscopically. Since this time several outbreaks have occurred, but the dates apparently bore no such relation to the previous attacks.

For the six months immediately following the arrival of troops at this post, men and officers were quartered in tents, all of which were floored and elevated from 2 to 4 feet above the ground. The camp site was upon a rolling plain, the ground was high and well drained, and distant from any marsh or swamp land. A number of ravines, or arroyas, carried away the surface rain water, and except in rainy weather these ravines were dry. The dews were very heavy. There were no jungles or excessive growths of tropical vegetation in the immediate vicinity of the camp, and the camp site seemed well chosen. Yet it is true that the classical conditions, climate, telluric and atmospheric, which have always been considered necessary for the propagation of malarial fevers were present in some degree at all times. Mosquitos of several varieties were incessantly present in great numbers.

The experiments and demonstrations looking toward the incrimination of the mosquito as the cause of malarial infection, which have been made during the past few years in various parts of the world by numerous observers, have undoubtedly fixed the guilt of many cases of malarial infection upon that insect. There has, however, been no proof adduced that infection does not occur in other ways. The artificial production of the disease in man has been accomplished, it is true, only by inoculation of human malarial blood and by mosquitoes fed upon such blood. All experiments looking toward artificial infection through the digestive and respiratory tracts have failed. Conceding all that is claimed by the most ardent advocates of mosquito infection, it is difficult to persuade ourselves that a malarial epidemic of such proportions as the one observed here in September, during which more than 50 per cent of the residents of the post suffered, could depend solely upon the mosquito for its spreading. (The strength varied from 1,768 in February, 1899, to 393 in January, 1900. The monthly number of admissions for all causes was highest in August, when 600 were recorded in a strength of 1,197; but the largest absolute number of admissions for malarial fever, 443, occurred in September when the mean strength was only 883 men).

No experiments with mosquitoes have been conducted at this post, but I was able upon one occasion to obtain from a mosquito human blood corpuscles containing malarial parasites. This occurred in the case of a colleague who had an attack of æstivo-autumnal fever lasting eight days. One morning some weeks later a mosquito full of blood was captured within the doctor's mosquito canopy. The body of the mosquito was punctured with a needle, the blood expressed upon a cover glass, mounted and examined with the one-twelfth oil immersion lens. Human red blood corpuscles were readily recognized, and, in two or three, small hyaline organisms with amœboid movements were observed. The doctor's temperature was taken and found to be slightly above 99° F., and a specimen of his blood showed similar hyaline forms slightly larger than those obtained from the mosquito, but not in great numbers. The expected paroxysm was averted by the prompt administration of quinine. This experiment was verified by Dr. J. F. Presnell. I can readily understand how this mosquito might have conveyed infection to another individual, and I have no doubt that numbers of such cases occurred.

Patients treated in this hospital for diseases entirely distinct from malarial fever developed it in our wards, having been in the hospital longer than the maximum incubation period. (See table of incubation periods in Thayer's Lectures on the Malarial Fevers, p. 100.) And yet until the possibility of infection being borne by the atmosphere is positively disproven, I am not prepared to lay the entire responsibility upon the mosquito. I do not believe that infection in any of our cases occurred through drinking water. From the first this entire command has been supplied with freshly-filtered drinking water only. In July the troops began moving into frame and stone buildings situated at the highest point in the town. Coincident with the removal into barracks there was a marked increase in the number of cases of malarial fever, which I believe was in no way associated with the change in quarters, but referable rather to recurrences and the advance of the rainy season, when malaria is notoriously worse in this country. So far as I have been able to observe, the mosquitoes are quite as numerous in the barracks as in the old camp, but the facilities for protection against them are much greater. All the troops were early provided with canopies of mosquito netting, but, obviously, these protect only during that portion of the twenty-four hours spent in bed, viz, about one-third of the time.

An effort has been made to destroy the breeding places of mosquitoes by drainage of near-by swampy land and the spreading of petroleum (kerosene) upon the surface of all standing water in pools, barrels, or other reservoirs; but I am inclined to coincide with the conclusion of Celli and Casagrandi,[1] that "while the problem of destroying mosquitoes is experimentally solvable, it will practically be so only when economic interest desires it." As they point out, the "opportune season for killing the larvæ is in the winter, when they are least in number in the waters, and new generations are not born." But in Cuba there is no winter. The destruction of the mosquito in Cuba is a problem not likely to be easily or immediately solved.

During the spring months the prevailing type of malarial fever at this station was the intermittent, nearly always of the tertian variety, and invariably associated with the presence of the benign tertian organism in the blood. Naturally quotidian fevers were frequently observed, but were always found to be due to several families of the tertian organism sporulating upon successive days. The quotidian fevers frequently changed to the pure tertian type and were promptly cured after the parasites were reduced to a single group of the tertian variety by quinine properly given.

I have at no time observed quartan fever or its parasite.

As the season advanced there was a progressive increase in the number of cases of continued malarial fever, and during the later months of the rainy season at least 50 per cent of the cases were, in my judgment, of the continued or remittent variety.

Malarial fever, as it occurs in Cuba, naturally divides itself into two classes, the mild and the severe. It is also divided clinically into two great classes, the intermittent and the continued or remittent. Generally speaking, the intermittent fevers are benign and mild, and the continued or remittent are severe and grave. In regard to the use of the term remittent, Manson[2] writes as follows: "Since it has been found that what was designated remittent fever is produced by quartan, tertian, and quotidian parasites—the fact of intermittency or remittency being more or less a matter of accident—it has been considered advisable to expunge the term remittent fever as indicative of a distinct species of plasmodium disease. * * * The intermittency or remittency of any given fever depends in great measure on the simultaneousness or the reverse of the maturation of the crowd of parasites giving rise to it. If all the parasites present are of nearly the same age, they mature approximately simultaneously and we have an intermittent; if they are of different ages they mature at different times scattered over the twenty-four hours and we have what is known as a remittent." Thayer[3] classifies malarial fevers, safely and conservatively, as: (1) The regularly intermittent fevers, (*a*) tertian fever (*b*) quartan fever, (caused by benign parasites). (2) The more irregular fevers, æstivo-autumnal fevers (caused by malignant parasites). This classification corresponds with the natural division into benign and grave fevers given above, and holds good for Cuban malarial fevers.

Of the regularly intermittent fevers it may be said that they differ not at all or very little from the type familiar to practitioners in the United States, and they may therefore be dismissed from this consideration with brief remark. As intimated above, the regularly intermittent malarial fevers are more prevalent in the spring and winter, but are to be observed at all seasons in Cuba and probably constitute 50 per cent of the total number of malarial fever cases.

There is but one absolute and accurate method of diagnosis, viz, the microscopical examination of a specimen of the patient's blood. All other methods are fraught with elements of error. The microscopic method is exact, accurate, and invariable. The plasmodium malariæ is always present in every case of intermittent fever and so readily found that the objection that an elaborate technical knowledge is necessary can not be advanced. Any medical man with a general knowledge of the use of the microscope can acquire in a short time, with the aid of one of the several excellent illustrated works upon diagnosis, the necessary technical skill. A knowledge of staining is not essential, as the best results are obtained with unstained blood. The prevalent idea that the previous administration of quinine makes useless a search for the plasmodium is not in my experience entirely correct. The presence of moribund or fragmented malarial organism in the blood plasma and of pigment bearing leucocytes and deformed red corpuscles is of great value and may be observed for some time after quinine has been administered; and, indeed, a certain number of motile organisms often persist in the blood for a short time after sufficient quinine has been given to terminate the fever.

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[1] Therapeutic Gazette, October 15, 1899: "Destruction of the mosquito," etc. A. Celli and O. Casagrandi.

[2] Tropical Diseases, p. 37.

[3] W. S. Thayer, Lectures on the Malarial Fevers.

Next in value to the microscopic method comes the therapeutic method of diagnosis by quinine. The dictum of Osler[1] that "an intermittent fever which resists quinine is not of malarial origin," laid down as a clinical rule for practitioners in the United States north of Mason and Dixon's line, holds as good for Cuba, but the qualifying word "intermittent" must be borne in mind. I shall presently submit charts of cases of continued malarial fever which resisted quinine in the most obstinate manner. A possible source of error lies in the method of administration of the drug. In my opinion, quinine should, whenever possible, be given in solution or capsules to insure its absorption. I have repeatedly recovered from the stools of patients quinine tablets of various makes and gelatine-coated pills which were readily compressible and apparently fresh. It is but fair to state that in every such case digestive derangement of some form was present, but it is well known that such derangement is fairly constant in all malarial fevers. Another element of error lies in the use of insufficient doses. The drug should be rapidly pushed to cinchonism, a condition caused in different individuals by widely variable doses.

The microscopic and therapeutic methods of diagnosis of intermittent malarial fevers are the only methods worthy of consideration. When the microscopic method is not available the therapeutic is most useful. Scientifically the therapeutic diagnosis should rather be a confirmative test to be used after the microscopic. If made use of first it invalidates to a certain extent the microscopic, but, as pointed out above, not entirely.

Clinically, intermittent malarial fevers are of three varieties: The tertian, most prevalent of all, in which the paroxysm recurs at intervals of forty-eight hours; the quartan, in which the paroxysm recurs at intervals of seventy-two hours, and the quotidian, in which the paroxysm recurs at intervals of twenty-four hours. It is doubtful whether a benign quotidian fever ever depends upon a special variety of the parasite, as do the tertian and quartan types. Quotidian recurrence can be very readily and perfectly explained by the fact of infection by several generations of either tertian or quartan organisms which sporulate upon successive days, thus giving rise to the twenty-four hours paroxysms. Most observers accept this explanation. Of the tertian organisms but two sets are required to produce quotidian paroxysms. I have invariably observed this combination in the cases of quotidian intermittent at this hospital. In the case of the quartan organism three groups of parasites sporulating upon successive days would produce quotidian paroxysms, but as no cases of quartan infection have been observed at this hospital, I have no personal experience with this form of quotidian fever. It should also be borne in mind that continued fever due to multiple infections of the tertian (benign) organism is theoretically possible, and Thayer[2] has observed one or two such cases. It is certainly a rare manifestation of tertian infection, as the tertian organisms show a tendency to arrange themselves in sharply defined groups.

The paroxysm of the regularly intermittent fevers usually consists of three stages—chill, fever, and sweat. Of 352 cases observed by Thayer at Johns Hopkins Hospital, 97.5 per cent had chills or chilly sensations. In the Pinar del Rio cases the percentage giving histories of chills is certainly smaller, but patients who upon first questioning do not recall a cold stage very frequently correct their statements. The chill may vary from the merest shivering sensation to a pronounced rigor. In those cases without prodromal malaise the chill is more frequently severe.

The diagnosis of the irregular malarial fevers is rendered less easy than that of benign malaria by reason of certain facts connected with the life cycle of the æstivo-autumnal parasite. As the young parasites increase in size they, with the red blood cells which contain them, show a decided disposition to retire from the peripheral circulation. As the hyaline forms of this parasite begin to accumulate pigment they become less and less numerous in the peripheral circulation and during the stage immediately preceding sporulation, and during that process they are but rarely to be found there. On the contrary, they are present in immense numbers in the blood of the spleen during and preceding the sporulating period. Although aspiration of the spleen to secure blood specimens is probably justifiable, occasionally it is certainly attended with greater risk than the needle prick for the extraction of a drop of blood from the ear or finger. I have in a few cases observed sporulation of the æstivo-autumnal parasite in blood obtained from the ear, but it is by no means a common observation. It is owing to this tendency of the æstivo-autumnal parasite to disappear from the surface circulation as it approaches sporulation that there is such difficulty in determining the exact time of its cycle. There is considerable difference of opinion upon this point, and it is doubtless a less constant period than that of the benign parasite. Thayer[1] believes that it may vary from twenty-four to forty-eight hours. Few observers have laid much stress upon the possibility of recognizing the youngest forms of the parasite (i. e., immediately following sporulation), but I believe the organism in this stage is more frequently to be recognized free in the blood plasma than is generally supposed. The similarity of the parasite in this youngest stage to particles of hæmoconien (Miller's blood dust) is to be borne in mind. It is sometimes difficult to distinguish between these bodies, particularly as they are very apt to coexist in the blood following sporulation, but careful discrimination will reveal that the parasite in this stage is endowed with a certain degree of motility, while the movement of the particles of blood dust is purely a molecular dancing movement. Moving currents of blood sometimes give the particles of hæmoconien the appearance of motility.

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[1] N. Y. Med. Journal, Nov. 4, 1899, p. 675.

[2] Thayer, Lectures on the Malarial Fevers, p. 116.

The size of the red blood cell containing a partly grown parasite of the æstivo-autumnal variety is almost invariably smaller than its fellows, while the partly or full grown benign parasite causes the corpuscle containing it to appear swollen and larger than its fellows. This is a point of differentiation which I deem of considerable value and more to be relied upon than the so-called "brassy" color of the corpuscle, caused by the invasion of the malignant parasite. This change in color is, however, usually apparent.

The presence of crescents and ovoids is of course indicative solely of the malignant parasite, but these bodies do not occur in the earliest stage of æstivo-autumnal fever, and when present are detected with some difficulty in the unstained specimen.

Flagellation is to be observed in both the benign and malignant parasites, and is therefore of little use in differentiation between them. A recent article by Craig,[2] detailing his observations of the flagellate forms of both varieties, is interesting in this connection.

A microscopic evidence of malarial disease not likely to be esteemed is the finding of pigment-bearing leucocytes in the blood. Often when the time of the examination is unfavorable for the discovery of the parasite itself it is possible thereby to make oneself reasonably sure of the recent presence of parasites in the blood, and thus assured perseverance will usually lead to the later detection of the parasite. Pigment-bearing leucocytes are so rare in all diseases other than malarial that their presence may be considered as almost diagnostic. Naturally this knowledge is of greatest value in the irregular fevers.

I believe all observers will agree that a simplification of terms descriptive of the various forms of malarial fever is highly desirable. To this end the elimination of terms which are really descriptive of symptoms of intercurrent diseases will greatly contribute. The possibility of the coexistence of malarial fever and some other distinct disease in the same individual must be admitted. My observation has included many such cases. It seems proper not to confuse physical signs and symptoms of distinct diseases occurring in the individual at the same time. Often the presence of leucocytosis discovered in search for parasites leads to the detection of some other disease. Ordinarily the blood of a malarial-fever patient does not show an increase of leucocytes.

Æstivo-autumnal malarial fever may be properly classified into types, in accordance with the predominance of certain symptoms, and in nearly every case it may be shown that these symptoms are evidences of involvement of special organs. Thus headache and delirium, intestinal pain and diarrhea, may indicate that the brain and its coverings, or the intestines, are being especially invaded by the parasites. In this manner we may use the terms descriptive of types, gastralgic, cardialgic, comatose, hemorrhagic, bilious, etc. I have seen no type of fever which could be properly classified as cardialgic or pneumonic, although I have observed intercurrent malarial fever and heart disease, and intercurrent malarial fever and pneumonia.

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[1] Lectures on the Malarial Fevers, p. 69.

[2] Observations on Flagellated Malarial Plasmodia. Descriptive of two varieties. C. F. Craig. N. Y. Medical Journal, December 23, 1899.

The patient suffering from an attack of æstivo-autumnal malarial fever of moderate severity may present the following objective and subjective symptoms: Malaise and anorexia for twenty-four hours, followed by an initial chill (which may not be repeated), a coated tongue, which is almost invariably increased in all its dimensions and shows the indentations of the teeth upon its borders, headache, nausea, vomiting, diarrhea, suffusion of the eyes, an icteric condition of skin and sclerotics, pain in the back and limbs, and epistaxis. In short, the picture may simulate closely the clinical picture of many of the acute infectious diseases, including yellow fever and typhoid. Albumen may be present in the urine, rarely, however, during the first days. The rise of temperature is usually gradual, compared with the rise in the regularly intermittent fevers, and may begin previously to the chilly stage, if there be one. At the end of twenty-four hours a decline in temperature is usually noted, and if the infection be a mild one or promptly recognized and treated, a second rise may not occur. Both onset and decline of fever in the æstivo-autumnal paroxysms are less sudden than in the regularly intermittent variety. From this point the disease may take on one of several types. If the infection be one of a single crowd of parasites of approximately the same age, and if sufficient quinine properly timed, either by design or accident, be administered, the initial paroxysm may be the only one. Or if the quinine be so administered as to destroy all the parasites but a few, and successive doses complete the destruction, the temperature may hover slightly above the normal point for a day or so. Cases of these types are not uncommon. The temperature curve may show remissions or even intermissions at intervals of from twenty-four to forty-eight hours, either with or without the classical accompaniments of chill and sweat; but in my Cuban experience such regular recurrences of paroxysms in fevers due to æstivo-autumnal parasites have been rare indeed, although charts have been made to show the thermometer readings every two or four hours. The Italian observers and others have apparently shown a definite periodicity in certain of these intermittents and remittents. If these observations are correct, I should be inclined to look elsewhere than to the parasites for the cause of this periodicity. I am of the opinion, and my opinion is strengthened by my microscopic observations, that the æstivo-autumnal parasite is, approximately, a quotidian parasite, but infection with multiple generations, sporulating at all times of the twenty-four hours, is so overwhelmingly the rule that one can readily understand why these fevers are irregular or continued rather than intermittents or remittents. Fevers of the first-described type, viz, those terminating at the end of twenty-four hours, are not infrequently mistaken for benign tertian infections. The true character of the infection, however, may be revealed by the microscope.

If at the end of the first period the fever becomes continuous, the group of symptoms commonly described as typhoid gradually appear, and the most acute observer is frequently long in doubt as to the true nature of the fever unless he has recourse to the diagnostic microscope.

The clinical picture of a severe case of continued malarial fever is startlingly like that of enteric fever. Here the therapeutic diagnosis by quinine often fails, but the microscope and the typhoid serum test remain our faithful servants. It is far from my wish to throw the slightest discredit upon the other methods of differential diagnosis. My desire is to emphasize the great similarity of the clinical pictures of enteric fever and continued malarial fever of the æstivo-autumnal variety and the possibility of absolute diagnosis. Fortunately cases of the last-described type do not constitute more than about 5 per cent of the whole, or 1 in 20. It should be borne in mind that the æstivo-autumnal infections run the gamut of severity, and that very mild cases as well as very severe ones may occur. There is danger that the mild infections may receive inadequate treatment and may assume pernicious types in later manifestations.

The occurrence of combined infections has already been referred to. Among the combinations observed in this series were those of malarial fever with dysentery, typhoid, tuberculosis (pulmonary), syphilis, and venereal diseases of all kinds, and various skin diseases.

One of the most interesting sequels of æstivo-autumnal malarial infection observed was a case of double retinitis pigmentosa (so pronounced after repeated ophthalmoscopic examinations) in an individual whose previous history was entirely negative.

It is frequently difficult to decide whether or not dysenteries, apparently of the simple catarrhal variety which occur coincidently with malarial fever, are in any way referable to the latter disease. Their apparent cure in certain cases by quinine strongly points to a relation between the conditions. The ambulatory fever cases are most apt to present this symptom.

No case of amœbic dysentery or liver abscess has been observed at Pinar del Rio.

The possibility of confusing cases of insolation with malarial fever is to be borne in mind.

A febrile malaria exists probably more frequently than is generally supposed, particularly in subjects who have experienced several attacks of malarial fever. It probably never occurs except as a sequel of the latter. Its diagnosis can only be made microscopically. I have observed a number of cases, in all of which the parasite was of the æstivo-autumnal variety. The symptoms are malaise, headache, nausea, and sometimes vomiting, occurring with an abortive chill or sweat.

Naturally malarial cachexia has been frequently observed in the subjects of repeated æstivo-autumnal infections. It is almost invariably associated with a secondary anæmia, often rather profound in degree. It is in this condition that administration of arsenic is valuable. I have found arsenic utterly valueless in the treatment of acute malarial fevers. The experiment of administering Fowler's solution in two and three minim doses three times a day to each man in the command was tried at this post, and at one other in this province, during the spring months of 1899. This procedure was based upon the alleged prophylactic and curative value of arsenic in the malarial fevers. It is only necessary to refer to the increased number of cases during the following months to show its utter uselessness in preventing malarial infection.

Contrary to the experience of recent writers, the urine in our malarial fever cases rarely contained albumen. Even in our gravest cases its occurrence was exceptional. Hæmoglobinuria was observed but infrequently, and never as a post-malarial affection. No case due to quinine administration was observed. The spleen was usually demonstrable in cases lasting four or five days, and, in some instances, was the seat of considerable pain. Malarial hepatitis was observed in one case of recurring æstivo-autumnal fever. Jaundice of a moderate degree was rather frequently observed, but severe catarrhal jaundice was a much less frequent complication than in a similar number of typhoid fever cases observed in the military camps in the United States in 1898. The jaundice in malarial fever cases is in proportion to the amount of red-cell destruction, but, as Thayer points out, it is due to an excessive production of bile, the result of the effort on the part of the liver to dispose of the excessive amount of pigment in that organ.

The opportunities for observation of pathological conditions post-mortem have been extremely limited, as no autopsy has been made. In the series of 1,904 cases upon which this report is based but 4 deaths occurred. Of these 4 fatal cases but 1 occurred in my own service. The prominent symptoms in these cases are noted below.

I. T. E.; pernicious malarial fever closely simulating typhoid fever, but Widal test negative. Malarial parasites (æstivo-autumnal) present in variety of forms in the blood on admission and throughout the disease. Gastric crises and profound sweats, at which times large numbers of young organisms were found. Spleen greatly enlarged. Urine acid; 1022; no albumen. Violent delirium, coma; death on eighteenth day.

II. M. J.; pernicious malarial fever (æstivo-autumnal parasite), duration 4 days; high temperature, wild delirium, profuse sweating, coma 36 hours, ending in death.

III. W. W.; pernicious malarial fever (æstivo-autumnal parasite), duration 18 days, high temperature, no delirium; general purpura appeared upon ninth day, bleeding from gums, left hemiplegia, coma (brief), preceding death.

IV. W. B.; pernicious malarial fever (æstivo-autumnal parasite), two attacks, duration of first 13 days. Second attack, after interim of 8 days, terminated fatally at end of a week; a few purpuric spots observed; coma 12 hours; death. This man served through the campaign in the Philippines without illness. Upon reenlisting he came to Cuba and was immediately taken ill with malarial fever.

It will be seen that all of the fatal cases developed coma, and that cases III and IV were distinctly hemorrhagic, case III being a well marked instance of cerebral hemorrhage.

When we consider the death rate of this series, less than one-fourth of one per cent of all cases, and remember that these cases were all cases of West Indian malarial fever, reputed world-wide to be peculiarly pernicious, we are convinced more forcibly than ever before of the inaccuracy and untruthfulness of the statistics relating to malarial fevers in every city of the United States. Truly this reflects most discreditably upon the diagnostic acumen and abilities of the physicians of the United States, and we may reasonably expect to see a wonderful decrease in the total number of malarial fever cases, and of deaths from the same, in future public health statististics as the scales fall from the eyes of the men who have made these statistics untruthful and misleading.

There remains to be considered the important matter of treatment. The observation of a large number of cases within a year has brought home to me certain convictions. First of all, I am convinced that quinine is a specific in the treatment of malarial fevers of all kinds. This statement may seem to be out of harmony with some of my expressions in the foregoing pages, but in reality it is not so. I have stated and shown by charts that certain fevers, undoubtedly uncomplicated malarial fevers, withstand for a long time very heavy doses of quinine. But I have not intimated, I believe, that these cases were not ameliorated, kept within control, and eventually cured by the drug. That many more than four deaths would have occurred in the 1,900 cases referred to without the heroic use of quinine, I am morally certain. The fact that some of these cases have been able to take without perceptible ill effect as much as a thousand grains of quinine in a short time and have eventually recovered, and the fact that for one case which persists for a time in spite of quinine twenty perhaps will be immediately cured, constitute for me evidence entirely convincing as to the specificity of quinine.

Considerations of the utmost importance are the time and method of administration and the dosage.

The proper time to administer quinine is at a period sufficiently in advance of the sporulation of the parasites to assure the absorption of the drug into the blood, and its presence there in solution when a sporulation occurs. It is generally agreed by observers that the parasite within the red blood cell is protected to a certain degree, varying with its stage of development and the degree of degeneration of the red corpuscle, and that it is most vulnerable to the destructive action of quinine when free in the plasma immediately after segmentation and sporulation. The important things to know, then, are the length of time elapsing between the administration of the quinine and its presence in solution in the blood and the exact time of sporulation. The former naturally depends upon the method of administration, whether by mouth or needle, and if by mouth upon the solubility of the drug and the activity of absorption in the individual. The approximate time of sporulation of the benign parasites, tertian and quartan, is fortunately known after the first paroxysm. I consider the method of administering a dose of quinine by the mouth two hours before, one hour before, and during the paroxysm, and a fourth dose an hour later, a rational and effective method in the regularly intermittent (benign) infections.

In the infections of the malignant (æstivo-autumnal) parasite, rational treatment is rendered more difficult by the uncertainty of the time of sporulation of any given group, and the infrequency of infection by a single group. As has been pointed out, these cases are usually cases of multiple infection, and groups are probably sporulating throughout the entire twenty-four hours, and parasites sporulating are but rarely perceptible in the peripheral circulation. The indication, therefore, would appear to be to keep the patient's blood by means of quinine in a condition as toxic as possible to the young organisms as they escape into the plasm after sporulation. This can only be accomplished by the exhibition of quinine at rather frequent intervals during the entire twenty-four hours. If the case be distinctly paroxysmal we may be guided by the fact to give larger doses before and at the time of the paroxysms. I believe a frequent cause of failure is the omission of quinine exhibition during the night. In a general way I believe it is well to give quinine at intervals of three hours throughout the twenty-four.

Quinine may be introduced into the circulation by several routes, viz, through the digestive tract by mouth or rectum; through the skin by inunction or hypodermatic injection, and by direct injection of a solution into the veins. Theoretically, the direct injection into the veins seems to be the most rational method, overcoming the possibility of failure of absorption when given by mouth and when thrown directly into the tissues. I have never made use of this method, but shall certainly do so in severe cases hereafter if the opportunity presents. For practical purposes the methods of inunction and rectal administration may be disregarded. In most cases quinine given by the mouth in acidulated solution or capsules will ultimately destroy the malarial parasites in the blood provided the stomach remains tolerant. When the stomach loses its tolerance before the destruction of parasites is complete, resort must be had to hypodermatic or intravenous injection. I believe the administration of ginger, powdered in capsules with quinine, or in syrup added to solutions of quinine, or in the form of ginger ale, assists materially in preserving the tone and tolerance of the stomach.

As to dosage I am guided by effects, always bearing in mind the points relative to time set forth above. Microscopic and thermometric observations are better indices of the effect of quinine in malarial fevers than the subjective sensations of the patient. In a general way I may say that I have found 2, 3, and 5 grain doses of quinine by the mouth, insufficient in the Cuban malarial fevers; I prefer doses of 10, 12, or 15 grains. If resort must be had to the hypodermatic method certain precautions are indispensable. A complete and sterile solution not extremely concentrated, an aseptic instrument, and an aseptic technique will exclude the possibility of abscess formation. If for any reason the solution is not absorbed, necrosis of the soft tissues containing it may occur, but these pseudo-abscesses will be found not to contain pus. The bimuriate of quinine and urea, by reason of its complete solubility, has given the best results. A syringe larger than the ordinary hypodermatic syringe should be used and the needle should penetrate to the deeper tissues of the back or buttock. The arm is not a favorable site for these injections. An antitoxin syringe two-thirds full of a solution of 10 grains of the bimuriate of quinine and urea may be used. I have found this dose, repeated according to effect, about the proper one. The greatest care to secure asepsis in preparing the skin, solution, syringe, and the hands of the operator must be observed if abscesses are to be avoided. The injections are frequently followed by pain, which sometimes persists for several hours. The use of antipyretics and analgesics, such as phenacetin and acetanalid in various combinations, undoubtedly adds greatly to the comfort of the patient, and under ordinary circumstances I can see no good reason why they should be withheld.

The various conditions of asthenia, hyperpyrexia, diarrhea, delirium, etc., should be met with appropriate treatment as they arise. It seems needless to add that the conservation of the patient's vital forces and strength by proper stimulation, nourishment, and nursing is of as great importance in malarial as in other fevers.

DENGUE.

At Columbia Barracks, Quemados, Cuba, early in the second week of September, 1899, several cases of fever were reported in one of the companies of the Eighth Infantry. The disease spread from this to adjoining companies until it became epidemic. On October 10 the troop barracks of the Seventh Cavalry became invaded, that nearest to the infantry camp being first infected. The daily sick report of this regiment rose from 52, on October 10, to 108 on October 18. The artillery troops became affected October 23, and in this command the maximum was reached on the 28th of the same month. On October 18 the post report showed a maximum of 291 cases of this fever under treatment.

The disease was carefully studied by Acting Asst. Surg. Najeeb M. Saleeby. Thermographs and histories of 159 of the cases were recorded, and to his report were added many diagrams showing the relative positions of the various barrack buildings and the curves of prevalence of the disease in each. Dr. Saleeby recognized a febrile disease of one paroxysm declining to normal on the third or fourth day, but in many of the cases having a second and milder paroxysm which prolonged the return to the normal until about the sixth or seventh day. Quinine had no curative influence, and microscopical examination of the blood demonstrated the absence of the malarial parasite. The disease was distinguished from yellow fever by its benign character, no death having occurred, and by the absence of albumen in the urine, jaundice, and internal hemorrhages. Dr. Saleeby rejected the suggestion that his cases were cases of dengue, and held that they were either mild cases of yellow fever or cases of a peculiar and hitherto undescribed fever (one of the calenturas of the Cubans), which probably has an acclimating influence and may hereafter be shown to be protective against attacks of yellow fever. In these views he is not sustained by Capt. A. N. Stark, assistant surgeon, United States Army, the post surgeon, who was himself one of the sufferers from the disease and who regarded his attack as one of dengue. Maj. Jefferson R. Kean, surgeon, United States Volunteers, chief surgeon Department of Havana and Pinar del Rio, also regarded the febrile outbreak as one of dengue, and reported that about 380 of the cases borne during October on the sick report of Columbia Barracks as malarial fevers involved errors of diagnosis. He considered such a sudden and enormous increase in malarial prevalence in the absence of any altered condition of the sanitary surroundings to be highly improbable, and from the character of the cases regarded the outbreak as an epidemic of dengue. He attributed these errors to the absence of systematic blood examinations on admission, and to the apparent response of the fever to the therapeutic test. In tropical malaria quinine often requires four or five days to bring the temperature down, and as in dengue the temperature falls to normal in about this time, the specific treatment is credited with the result. Nevertheless, in discussing Dr. Saleeby's paper, Major Kean agreed with the writer that our nosological table does not contain all the fevers of the Tropics. He continued:

The short mild continued fever of about a week's duration, with a descending temperature curve from the first or second day, is an old acquaintance. Whether this is an acclimatizing, i. e., a very mild sporadic form of yellow fever, is an interesting and important subject for investigation. Dr. H. R. Carter, Marine-Hospita Service, recently in conversation advanced the following facts, which are suggestive in this connection: All quarantine authorities agree that ten years' residence in Havana entitles a man to be considered immune; that is, that in that time he wil certainly have had yellow fever or an immunizing fever. The Spanish immigration—nonmilitary—for years past has been on an average 15,000 a year. Of these, by a moderate estimate, 5,000 make their home in Havana. Approximately 5,000 children are born in Havana each year. Supposing that half of these die before they reach the age of 10, we have 2,500 a year to acquire immunity in the same way that the Spaniards do. Thus we should have 7,500 cases a year of immunizing (yellow fever. The average annual civilian death rate in Havana from yellow fever is 210 which, with a death rate of, say, 30 per cent, would give 700 cases of clinically recognized yellow fever a year. Thus we would have left 6,800 persons a year who acquire immunity through fevers not to be recognized as yellow fever in the home of tha disease.

The following extracts from Dr. Saleeby's report may be of interest

General description.—The disease is ushered in by the same variety of initia symptoms as the other specific fevers. But two modes of onset seemed to distinctly prevail and very eminently represent the manner of the declaration of the disease In the first class of cases the attack sets in with headache and a slight rise of temperature. These gradually and progressively increase in intensity. The headache becomes very severe and frontal, and is soon followed by intense general muscula pains in the back, loins, and lower extremities. They are rheumatic and grippe-like in character and are very distressing. As the temperature rises slight chills or chilly feelings are felt at intervals, alternating with feverishness. If the temperature rise rapidly, a severe chill may occur. The fever continues to increase with or without a slight interruption, and generally attains its maximum height on the second day The temperature then ranges from 102° F. to 104° F. and the pulse from 80 to 104 febrile and full. The headache and the muscular pains already intense become excessive. The patient is completely prostrated in a severe case. Delirium may occur. With the headache there is dizziness, insomnia, and restlessness. The eye are congested and ache, and the face is flushed. There is complete anorexia and nausea and sometimes vomiting. The bowels are sometimes normal, but often present diarrhea or constipation. Diarrhea is more general than constipation, and soreness of the abdomen is not uncommon. This condition may be maintained during the third, and less frequently the fourth day of the disease, but generally the feve begins to decline after the second day and reaches normal between the fourth and seventh day. With the decline of the fever all the other symptoms abate. The nausea and vomiting are the first to cease. The headache holds closer relation to the temperature than the muscular pains, and generally lasts a day or two after th termination of the fever, while the muscular soreness continues longer. During convalescence bowel disturbances are not rare.

In a minority of the cases the maximum temperature is attained on the first, the decline begins on the second, and the fever may terminate as early as the third day In another minority, consisting of about one-third of all the cases, a second rise o the fever follows after a brief intermission of less than one day. With this secondary rise the same symptoms occur, but they are shorter in duration and milde in character than during the first paroxysm. The occurrence of the second paroxysm does not necessarily indicate a severe attack.

In the second class of cases the onset is very sudden and violent. The attack starts directly with a severe chill, which is immediately followed by excessive headache and very intense muscular pains. The maximum temperature is generally attained on the first day. There is immediate prostration and severe gastric disturbance.

The temperature chart represents either one paroxysm of fever or two paroxysms separated by a brief intermission. About two-thirds of the cases present one paroxysm only. These prevail during the first period of the epidemic and at every outbreak. The first paroxysm indicates a continuous run of fever for from three to seven days. It is made up of two parts—a rapid rise, representing the stage of development, and a slow, gradual decline. In case the maximum temperature is reached on the third or fourth day, or the height of the fever be maintained more than one day, the stage of fastigium would then be represented by an intermediate oscillating curve.

The rise is completed either on the first or the second day. In the first case it is a straight, nearly vertical line, and in the second it is marked by a slight interruption after the first day. The remission after the second day is generally marked. The decline is nearly always by lysis. It is either a regular stepladder-like fall or a more or less gradual descent. To linger at 100° for one day or so is not an uncommon irregularity. Another rare interruption is caused by a secondary rise of the temperature on the fourth or fifth day. This may reach the level of the former rise and then end by crisis, or fall short of that, and then descend a steeper incline than it would have done otherwise.

In 63 out of 159 cases represented by the charts the fever returned after a short intermission and exhibited a second paroxysm. The intermission was generally less than one day, and seldom exceeded this limit. The temperature then may remain at normal or descend 1° or more below that, chiefly when the administration of quinine is free and prolonged. The second paroxysm might be of a remittent or continued type and resemble the first, or it might be intermittent and variable. The temperature rises to 100° and 101°, and its duration varies from one to four days.

Prognosis.—In mild cases some of the patients kept up and did not take to bed, and resumed their duties three days after the fever ended. Convalescence was rapid as a rule; complications were very rare; no death occurred.

Diagnosis.—This disease simulates remittent malaria and dengue. The former was presumed at the first outbreak, but the nature of the disease developed quickly and the difference was soon realized. Quinine utterly failed, except in increasing the distress of the patients, and no haematozoa were found in the blood. The similarity to dengue was greater on account of the severity and nature of the pains, but against this I urge the following facts: The infection seemed to distinctly arise from the ground soil of a certain locality and spread out by contiguity. The epidemic did not spread as such outside the limits of our camp, though the disease evidently existed in the vicinity and in Havana. No epidemic of dengue existed at the time in this province. The disease was preeminently a fever of one paroxysm; and in case there were two paroxysms the second followed immediately after a real intermission of less than one day's duration. The disease did not affect the joints at all, and was not accompanied by any distinctive general eruption. The eruptions observed simulated the primary eruption of dengue and only occurred in about 7 per cent of my cases. The second distinctive general eruption of dengue was never seen so far as I know. Not convinced, however, that the disease was either dengue or yellow fever, I adopted for the time being the term "simple continued fever," in recognition of its well-defined type.

Lately I interviewed some of the eminent physicians of Havana on this subject. They all remarked the close similarity the charts present to yellow fever, but on account of the absence of albumen in the urine and jaundice, and on account of the benignity of the epidemic, they pronounced them different and separate. Some called this fever the "acclimation fever of Cuba," and claimed that it gives immunity from yellow fever. Others called it "fievre inflammatoire," and claimed that the chief difference between this and yellow fever is the absence of albumen in the urine. Other indefinite terms like "infectious fever" and "gastric fever" were suggested. Dr. Tomas V. Coronado, who is a very reliable authority on the fevers of Cuba, tells me that what some call inflammatory fever is really yellow fever. He holds that dengue might occur in an epidemic form without eruption, but that it does not exist at the present time in Cuba. He also affirms that the character of this epidemic and the manner of its extension strongly contraindicate dengue, and tends to ally it with yellow fever.

Lacking the confirmatory evidences on the question, I remain undecided as to the real diagnosis. But, in considering the views and different statements of the native physicians on yellow fever and other unclassified diseases they describe, I simply remark that either there exists in Cuba an endemic disease that holds a close similarity to yellow fever, and which has not yet been recognized and differentiated, or that a benign form of yellow fever may exist.

Treatment.—The disease having been benign, the treatment was chiefly symptomatic, and was directed mainly to relieve the pain and reduce the temperature.

FEVERS OF UNDETERMINED CAUSATION.

Admission rates per thousand of strength of the Army, regulars and volunteers, for the calendar years 1898 and 1899.

Year.	Army.	Cuba.	Porto Rico.	Pacific islands.	United States.
1898	28.09	76.57	45.85	59.96	21.59
1899	25.48	41.75	12.07	37.04	8.34

In 1898, 4,152 cases with 1 death, and in 1899, 2,689 cases, none fatal, were recorded, giving the rates of admission shown in the above tabulation. In general terms these cases were either malarial or typhoid, the probability being that the majority resulted from malarial influences, for the annual admission rates of these undetermined cases were highest in Cuba and the Pacific islands where the prevailing fevers were malarial, and the curve of their seasonal prevalence in 1899 coincided with that of malarial fevers. In Cuba they prevailed chiefly during the four months August to November, inclusive, the highest rate occurring in October, the month of maximum prevalence of malarial diseases and of minimum prevalence of typhoid. The maximum rates of typhoid fever occurred in April and May, when the rates of the undetermined fevers were considerably below the mean of the year. Again, in the Philippines, the rate of admission of these fevers was above the mean of the year when the typhoid rate was low, and considerably below the mean of the year, from February to August, when the typhoid rate was high; but the maximum rate of the malarial and of the undetermined fevers occurred in November, and the minimum rate of both in February.

DIARRHEAL DISEASES.

The following tabulation presents the prevalence and results of diarrheal diseases in the Army, regulars and volunteers, as a whole, and of those parts of it stationed in Cuba, Porto Rico, the Pacific islands, and the United States:

[Ratios are per thousand of the strength.]

Commands.	1898.						1899.					
	Cases.	Ratio.	Discharges.	Ratio.	Deaths.	Ratio.	Cases.	Ratio.	Discharges.	Ratio.	Deaths.	Ratio.
Army	57,436	388.62	65	0.44	214	1.45	40,180	380.69	95	0.90	226	2.11
Cuba	2,796	335.05	1	.12	77	9.23	8,709	434.35	10	.50	29	1.45
Porto Rico	4,370	767.61	2	.35	8	1.41	2,023	542.80	6	1.61	10	2.68
Pacific Islands	3,959	399.60	20	2.02	25	2,52	25,249	642.80	62	1.58	180	1.58
United States	16,120	374.19	42	.34	104	.84	4,027	95.45	17	.40	7	.17

In the Army of the United States, during the decade 1887–1896, the average annual admission rate for diarrheal diseases was only 107.09 per thousand of strength, with 0.17 per thousand men as the rate of discharge for disability and 0.10 as the death rate. In 1897 the admission rate was only 73.17 per thousand, with 0.11 as the discharge rate and no death. In 1898, however, the admission rate rose to 388.62 with 0.44 as the rate of discharge and 1.45 as the death rate; and in 1899 it continued high, 380.69, with rates of discharge and of death about double those of the preceding year.

This large increase in the prevalence of diarrheal diseases in 1898 was consequent on the great aggregation of untrained volunteers in our camps in the United States, and the exposures of our troops, regulars and volunteers, on active service in Cuba, Porto Rico, and the Philippine Islands. Among the large number of troops in the camps in the United States the admission rate was over three times and the death rate over six times greater than the annual averages of the decade mentioned. This was due to dietetic errors and unnecessary exposures on the part of raw troops. Although the admission rate of the commands in Cuba was somewhat lower than that of the troops in the United States, the high death rate of 9.23 per thousand of strength among the former indicates a wholly different type of diarrheal trouble. Among the regular troops in Cuba at this time, 1 case in every 9.8 was reported as dysenteric. In the Philippines the death and discharge rates were relatively high, 2.52 and 2.02, respectively, per thousand of strength; but in Porto Rico, although the prevalence was great, there was fortunately no corresponding increase in the gravity of the cases. In Porto Rico there was only 1 death in 546 cases; in the United States, 1 in 443 cases; in the Pacific islands, 1 in 158 cases, and in Cuba, 1 in 36.4 cases.

In 1899, under the better sanitary conditions which resulted from the experience of the preceding year, the admission rate for diarrheal diseases in the United States fell to 95.45 per thousand of strength, and the death rate to 0.17, satisfactory approaches to the normal rates of times of peace; but the rates of the Army as a whole were kept high by high rates in the Islands. In the Philippines the admission rate became increased to 642.80 and the death rate to 4.58 per thousand of strength. In Porto Rico, also, the dysenteric character became more developed, but in the garrisons of Cuba the dangerous type of the disease was markedly diminished. In the United States there was 1 death in 575 cases; in Cuba, 1 in 300 cases; in Porto Rico, 1 in 202 cases, and in the Philippines 1 in 140 cases.

The absolute number of cases of dysentery in the Philippine Islands, as distinguished from acute or chronic diarrhea, can not be gathered from the reports, as in many instances the same case is recorded on one report as diarrhea and on another as dysentery.

Dysentery.—Lieut. Richard P. Strong, assistant surgeon, United States Army, a member of the board on the study of tropical diseases, see page 21, made a careful study of dysenteric cases in the laboratory of the First Reserve hospital, Manila, P. I., in which work he was assisted by Hospital Steward W. E. Musgrave, M. D., pathologist of the hospital. They reported the results of their investigations June 17, 1900. During a period of ten months prior to this date, 9,063 cases were treated in the hospital, and 1,328 of these, or 14.64 per cent of the total cases, were cases of dysentery. Of these dysenteric cases, 581 were returned to duty from the First Reserve hospital; 125 ended fatally in the hospital; 283 were transferred to other hospitals in the Philippines, and 339 were sent to the United States for possible benefit from the sea voyage and change of climate. Their studies included 111 necropsies on dysenteric cases, 21 of which, on anatomical grounds, they classified as acute specific dysentery, 11 as subacute specific dysentery, and 79 as amœbic dysentery. A bacillus was isolated in 17 of the 21 cases classified as acute specific dysentery, and in 2 of the 11 subacute cases. In 1 of the former and 2 of the latter, this bacillus was not looked for. In 26 of the amœbic cases the bacillus was not found; in the remaining 53 it was not looked for. In 68 of the 79 amœbic cases motile amœbæ dysenteriæ were found. The bacillus isolated by Drs. Strong and Musgrave is similar to that discovered by Shiga in 34 of 36 cases studied in Kitasato's laboratory in Tokio, in 1898, in connection with the epidemic of dysentery then prevailing in Japan. They regard this bacillus dysenteriæ as the specific cause of what they have called acute and subacute specific dysentery. The blood serum of these cases usually exercised a marked agglutinative reaction on this bacillus. This reaction was observed as early as the third day and was generally distinctly manifest by the fifth or sixth day. In one grave case which proved fatal on the fourth day there was no reaction with the serum, either before or after death. The onset and progress of amœbic and specific dysentery are described as somewhat different. In the amœbic cases they found generally a gradual onset and an irregular course marked by periods of intermission and exacerbation of the diarrhea, with a tendency to chronicity and the frequent occurrence of abscess of the liver. In the specific cases, on the contrary, the onset is usually abrupt, the stools at first containing mucus which afterwards becomes streaked or colored with blood. The movements increase in frequency until finally the control over the sphincter appears to become lost. Straining and tenesmus are often excessive. There is great thirst and the tongue has generally a whitish coat. Extensive hemorrhages are unusual, but occasionally occur. Toward the end the movements become less frequent and may cease altogether shortly before death. With all this the accompanying pyrexia may not be high. The pulse is about 100, becoming very rapid as the patient dies from cardiac exhaustion. Nausea and vomiting are uncommon, but there is often tenderness on deep pressure over the colon. Recovery from these severe attacks is rare. Death or recovery takes place generally within two weeks. In the cases which recover, the urgency of the symptoms becomes gradually lessened. Recovery may then be early and convalescence be established by the fifteenth day. In other cases the disease may become subacute and last for months.

This subacute or chronic stage was carefully studied and reported upon March 23, 1900, by Dr. Chas. F. Craig, acting assistant surgeon and pathologist of the U. S. General Hospital, San Francisco, Cal. Dr. Strong has said that 339 of the dysenteric cases of the First Reserve hospital were sent to the United States. Here they were studied by Dr. Craig as cases of chronic dysentery from Manila. He investigated the stools from 205 cases and the morbid anatomy of 25 necropsies. In his report he divides the cases into three classes, (1) the follicular, (2) the pseudo-diphtheritic, and (3) the gangrenous, which he considers rather as stages in the same pathological process, the second and the third as acute forms engrafted on the first.

The follicular cases were at least of two months' duration. There was but little tenesmus. The character of the stools is very fully described in Dr. Craig's report. Little blood was visible to the naked eye, but it was found pretty constantly on microscopic examination; mucus and pus rather abundant; pus cells often containing bacteria; intestinal epithelium abundant, sometimes in sheets with protoplasm granules and the cells sometimes vacuolated; bacteria in immense numbers, staphylococci, streptococci, and bacilli, the last of which preponderated. There was one long, slender bacterial form present in nearly all the cases, and in immense numbers; yeast cells frequent; cercomonas in 6 cases; anguillula in 1.

The morbid anatomy of the follicular cases may be briefly stated as follows: In all cases the stomach was congested in patches and showed areas of atrophy. The small intestine varied in color from nearly white to bright pink; coats very thin. Large intestine dull gray or slate colored, sometimes with very dark patches believed to be due to extravasated blood undergoing pigmentary change; coats thickened, in one case cartilaginous; calibre diminished; mucous membrane usually of a gray slate color, often with brownish pigmentation and acute congestion, and thickened; the follicles enlarged or ulcerated, or both; irregular punched-out ulcers of mucosa, or both it and the submucosa; cæcum and ascending colon oftenest affected, and next to them the rectum. In one case there was a follicular ulcer of the ileum near the valve.

The cellular elements of adenoid tissue were increased in number; tubular glands compressed and in places filled with a dense mass of leucocytes. Submucosa thickened, infiltrated with leucocytes collected in irregular masses which often obscured the muscularis; blood vessels but little engorged. Muscular coat, some leucocytes, more especially in the circular coat. No change in the serous coat. Solitary follicles enlarged, cells notably increased and surrounded by leucocytes. Much brownish and blackish pigment in adenoid tissue. Ulcers of solitary follicles varied in degree; in some the cellular structure broke down near the mucosa, involving the apex of the follicle. In a later stage the ulcer had undermined; the mucosa and submucosa were infiltrated with leucocytes; the ulcer never penetrated beyond the circular muscle; tubular glands sometimes fused with the follicles, forming cysts. Leucocytes and fixed tissue cells found in margins of ulcers and around blood vessels; fatty degeneration at junction of mucosa and submucosa. Number of leucocytes proportioned to depth of ulcer. If the circular coat was involved, the floor of the ulcer was irregular and composed of broken-down muscle fibers and leucocytes; the serous coat then was thickened. Besides the follicular ulcers there were also ulcers of the mucosa which destroyed the tubular glands more or less, and sometimes penetrated to the muscular coat; the edges of the ulcers and the submucosa were infiltrated with dense masses of leucocytes.

In three cases the pseudo-diphtheritic process had begun and the colon and rectum were a dirty greenish gray color with red patches; many areas covered with pseudo-membrane under which were small follicular ulcers; the exudate was very thin and very tenacious.

The pseudo-diphtheritic form was more common among the patients; an acute process on a chronic one. Prognosis grave. Essentially a coagulation necrosis; the necrosed tissue sloughing off and leaving superficial ulcers which did not penetrate to the circular coat. The necrosis was caused by pressure of the mass of leucocytes and of the pseudo-membrane assisted by the bactericidal poisons. Stools usually dirty brown, sometimes dark brown and almost black from the presence of blood; sometimes watery and exceedingly offensive; numerous red blood cells and pus cells, many of the latter having amœboid movements; but little mucous and that not glairy but more like pus; bacteria in immense numbers, cocci, spirilli, and bacilli, the latter preponderating; the same slender bacillus as was found in the follicular form; in three cases the cercomonas; shreds, strings, and pieces of pseudo-membrane of a dirty gray yellow or greenish color; also portions of mucosa, dirty gray yellow or greenish, in which glandular tissue could be microscopically made out; leucocytes were usually numerous; and clumps of granular material (detritus).

The morbid anatomy in the pseudo-diphtheritic form: The small intestine was leaden gray or very pale; its coats thin, though less so than in the follicular form. Large intestine grayish or greenish blue, with red or dusky brown spots; coats thickened, caliber narrowed; in two cases almost cartilaginous. The mucosa was a dirty greenish gray or dirty white, sometimes areas of bright red of acute inflammation; and was thickened, with dusky reddish folds. The ulcers did not penetrate beyond its submucosa; edges sloping; color between ulcers pale flesh color with patches of dirty gray or greenish exudate; shape generally round or oval, the latter the more common; sometimes communicated with each other by passages under the mucosa; there were often small ulcer cavities in the mucosa; sometimes the mucosa was elevated in places by accumulations of thin, glairy, nearly colorless fluid in the mucosa. Pseudo-membrane sometimes bright yellow, usually in irregular patches; sloughing in places in the form of patches, strings or shreds, the shreds giving the membrane a shaggy appearance; exudate usually tough and tenacious and most common in rectum and just below ileocolic valve. The small intestine showed patches of acute inflammation with areas of atrophy; hyperæmia of summits of folds; no ulcers. Stomach chronically inflamed, with atrophy and areas of congestion and pigmentation.

Microscopic appearances in pseudo-diphtheritic form: Columnar epithelium absent; adenoid tissue between tubular glands infiltrated with dense masses of leucocytes, and the glands invaded and pushed apart, the leucocytes extended in severer cases into submucosa; small ulcers beneath mucosa often not involving the submucosa; small cavities in mucosa surrounded by leucocytes; tubular glands inclosed by leucocytes; necrosis of the covering layer of the adenoid tissue and the leucocytes combined caused the ulcer, which had sloping or rounded edges and a smooth floor, densely infiltrated with leucocytes. Submucosa in neighborhood of ulcer had a vast swarm of leucocytes and connective tissue cells; blood vessels dilated and engorged. The slough was composed of degenerated leucocytes and granular detritus. The pseudo-membrane was a fibrillated, granular material, inclosing numerous leucocytes, blood cells, and immense numbers of bacteria; there was an increase of interglandular tissue and infiltration with leucocytes; in more advanced cases leucocytes were found in the submucosa; capillaries engorged, and there were many capillary hemorrhages in mucosa and submucosa; most noticeable before ulceration occurred. Leucocytes very numerous around solitary glands, which finally disappeared, replaced by dense masses of leucocytes; muscularis mucosæ also disappeared; increase of fibrous material in submucosa; circular muscle usually infiltrated with leucocytes and connective tissue cells. Pseudomembrane often thick and nearly homogeneous, without distinct fibrillation or cell structures, sometimes as thick as the mucosa and submucosa combined.

Dr. Craig considers the gangrenous form as an intense degree of the pseudo-diphtheritic. The mucosa and submucosa were gangrenous with streaks of greenish pus and had a horrible odor. The process supervened on the other forms. Death occurred from pyæmia, with metastatic abscesses. The stools were thin and slimy; color slate, brown, and black; odor very offensive; contained blood cells, greenish pus cells, and bacteria in immense numbers; large pieces of mucous membrane with glandular structure and dense infiltration of leucocytes; sometimes only granular detritus.

The intestines were matted together and easily torn. Large intestine greenish black with irregular areas of deep black corresponding to the gangrenous areas; coats generally thin and fragile. Small intestine reddish brown with areas of bile-stained tissue and many areas of pigmentation; coats very thin, easily ruptured; in two cases partly gangrenous, covered with necrosed tissue and pus, and with regular ulcers penetrating to muscular coat. Stomach grayish blue, with many areas of pigmentation in wall and acute inflammation. Internally the mucous membrane of the large intestine was reddish brown or greenish yellow or bluish; in rectum and sigmoid flexure greenish black streaked with yellowish green pus; near ileocolic valve dusky red with greenish and brownish areas, where gangrene had advanced more rapidly; surface of rectum and sigmoid covered with thick yellow-green pus and showed deep irregular ulcers with undermining edges, covered with shreds of tissue stained with blood and pus. Mucosa, submucosa, and muscular coat destroyed in large areas; in places, especially in rectum and around ileocolic valve, the mucosa and submucosa were greenish black, pultaceous, blood-stained, with an exudate of yellowish green pus and swollen areas from which on section there exuded pus and semitransparent glairy gelatinous fluid. Where the gangrene was most intense there were no distinct ulcers; in transverse colon were many ulcers varying in size and shape, some oval, transversely directed, edges undermined, penetrating to circular coat. There were also large irregular ulcers, with swollen, undermined, or sloping edges, covered with large sloughs; very few follicular ulcers. Where the gangrene had not involved there were many superficial ulcers of the mucosa; coats thickened.

Microscopic examination of rectum showed a mass of leucocytes, red blood cells, granular detritus, and broken-down muscular tissue; mucosa, submucosa, and circular muscle destroyed; small portions of mucosa and submucosa preserved in places and infiltrated with leucocytes, red cells, and fatty detritus. The mucosa in the situation of the ulcers was covered with pseudomembrane, consisting of leucocytes, fibrillated material, tubular glands, and adenoid tissue, infiltrated with leucocytes, red cells, and granular detritus. The ulcers were irregular in shape, undermined, and penetrated to muscular coat;

floor irregularly elevated, the elevations composed of fibrillated material in which were many leucocytes and blood cells. Submucosa showed leucocytes and many hemorrhages; muscularis mucosæ destroyed; muscular coats much thinned, with areas of leucocytes; infiltration especially numerous near ulcers; cyst-like cavities full of leucocytes between muscle fibres.

The complications found post-mortem were similar in the three forms, except that metastatic abscesses were found only in the gangrenous form.

Under the head of bacteriology, he reports that since October 4, 1899 (five and one-half months), he had made over 200 microscopical examinations of fæces in cases of dysentery, and had found the amœba coli in but 3 cases; he had not found amœbic abscesses of liver at all, and had failed to find the amœba in the intestinal mucosa, in scrapings from intestinal ulcerations or in sections of the intestine itself, stained with thionin or methylene blue. He, however, isolated a bacillus identical with that found by Dr. Flexner, in Manila, previously described by Shiga, and which was pathogenic to small animals. Isolated by plate method from scrapings of the floor and edges of intestinal ulcers in 2 cases of pseudo-diphtheritic dysentery. The bacillus was practically identical with the bacillus typhosus. He had not succeeded in staining any flagella. It agglutinated with the blood of the cases from which it was isolated, and also with the blood of a few other cases of dysentery, but not of all, suggesting the possibility of the agglutinating power being lost or that there were different varieties of dysentery in the hospital. He experimented on 4 guinea pigs, in one of which a diarrhea developed; the pig died two weeks afterwards. Acute inflammation, but no ulceration, of the entire intestinal tract was found. The organism was recovered from the spleen and intestinal contents.

Bacteria were always found in the intestinal coats. The number was less in the follicular form and seldom present at all in the muscular coat. They entered apparently by way of the lymphatics; were found in and between the tubular glands, no one species preponderating. They were numerous around the ulcers, mainly the micrococci. In the pseudo-diptheritic form, immense numbers of bacteria were found in the false membrane and in the mucosa, the micrococci preponderating; the same was also true for the walls of the ulcers and in the submucosa. In the gangrenous form bacteria were in immense numbers in its sloughs and diseased mucosa, submucosa, and muscular coat beneath the ulcers. In places, in all the forms, they were so numerous that they stained en masse, the separate organisms being indistinguishable. They were also abundant around hemorrhagic areas. Generally speaking, bacilli and micrococci were found in nearly equal proportion in all forms of dysentery, in the superficial part of the mucosa: but in the deeper layers the micrococci were more numerous than the bacilli.

Maj. A. C. Girard, surgeon, United States Army, commanding the General Hospital, Presidio of San Francisco, Cal., submitted the following tabulation showing the dispositions recorded in 484 admissions, January 1 to June 30, 1900, from the Philippines, with diagnoses of tropical bowel affections:

	Number.	Per cent.
Duty within 15 days from date of arrival	78	16.12
Duty within 30 days from date of arrival	97	20.04
Duty within 60 days from date of arrival	122	25.21
Duty after 60 days from date of arrival	68	14.05
Discharged within 30 days after arrival	5	1.03
Discharged within 60 days after arrival	22	4.55
Discharged after 60 days after arrival	15	3.10
Died within 30 days after arrival	9	1.86
Died within 60 days after arrival	2	.41
Transferred	5	1.03
Remaining	61	12.60
Total	481	100.00

The medical officers who had the care of these cases are generally of the opinion that the earlier a patient affected with tropical dysentery is transferred to the United States for treatment the greater is the likelihood of a speedy and lasting recovery. When a case becomes subacute or chronic instead of resulting in perfect recovery at the end of two or three weeks, it is believed that the chance of eventual recovery will be greatly improved by an early transfer to the United States. Besides this, it seems advisable to retain in service in this country men who have recovered from an attack of tropical dysentery, for reports from medical officers serving in the Islands show that a return to duty in the Tropics frequently means a recurrence of the disease.

The following is the report made by Drs. Strong and Musgrave on the etiology of dysentery:

PRELIMINARY NOTE REGARDING THE ETIOLOGY OF THE DYSENTERIES OF MANILA, BY LIEUT. RICHARD P. STRONG, ASSISTANT SURGEON, UNITED STATES ARMY, DIRECTOR OF THE ARMY MEDICAL LABORATORY, AND W. E. MUSGRAVE, M. D., HOSPITAL STEWARD, UNITED STATES ARMY, RESIDENT PATHOLOGIST TO THE FIRST RESERVE HOSPITAL, MANILA, P. I.

During the past ten months there have been 9,063 cases admitted to this hospital (First Reserve military hospital) for treatment. Among this number the hospital clinical records show 1,328 cases with a diagnosis of dysentery. Of these dysenteric cases 125 died, a mortality of 9.4 per cent. These figures, however, do not represent the actual mortality among them, for 339 cases of dysentery were transferred to the United States and 283 were sent to other hospitals. Only 581 were returned from here to military duty. Of those that were invalided to America a number died (for most of these cases were sent home because there was little hope of their recovery in this country), and of the number sent to other hospitals, as we know, also a proportion died, but we have no record of the death rate among these cases in either instance cited.

All these figures show, then, is that the number of dysenteric cases that have died here is not below 94 per 1,000 dysenteric cases.

The following table shows the statistics compiled from the hospital clinical records:

[Cases treated in hospital, 9,063; percentage of dysenteric cases to admissions, 14.64.]

Treated in hospital.	Total number.	Transferred to the United States.	Transferred to other hospitals.	Returned to duty.	Died.	Mortality.	Average number of days sick.	Percentage of admissions returned to duty.
Dysentery cases	1,328	339	283	581	125	9.4	21	43.7
Acute specific dysentery cases	712	141	116	398	54	7.58	15	55.8
Subacute specific dysentery cases	55	4	4	45	2	3.6	19	81.8
Amœbic dysentery cases	561	191	163	138	69	12.3	35	24.6

In a hospital of this size, often crowded to 1,300 beds, when the staff was necessarily much overworked at times, perhaps in many cases where hasty or insufficient examinations (both clinical and of the stools) were made, the type of the disease was not accurately diagnosed or recognized. At any rate, when we turn to our necropsy records we find, at least among the fatal cases, our statistics in regard to the variety of the disease somewhat different. The cases from the hospital clinical records, therefore, are not made the subject of our report, but are omitted. Only those cases are included which the writers have either studied clinically or at necropsy also, when the opportunity presented itself.

Our records show, of 271 necropsies, 111 cases of dysentery. Of these 111 cases, classified primarily entirely upon anatomical changes found at necropsy, and not from clinical symptons, there have been 21 cases of acute specific dysentery, 11 cases of subacute dysentery, and 79 cases of amœbic dysentery.

The following table gives a summary of our necropsies:

[Necropsies, 271.]

	Total number.	Average number of days sick.	Bacillus dysenteriæ obtained at necropsy.	Bacillus dysenteriæ not tried for.	Motile amœbæ dysenteriæ found at necropsy.
Dysentery, all cases	111	....	19	56	68
Acute specific dysentery	21	8	18	1	
Subacute specific dysentery	11	20	2	2	....
Chronic dysentery	79	....	....	53	68

It is not our purpose to define here just what we mean by these three anatomical types of dysentery. They will be referred to later. As a result of our investigations we believe that we have been able to recognize in the cases of dysentery from in and about Manila and in those from several more remote towns at least two distinct types of dysentery (viz, an acute specific dysentery and an amœbic dysentery), with two distinct etiological factors. The subacute type we regard only as a later picture of the acute stage of the specific dysentery and as having the same etiological factor. These two types, as stated, were classified primarily entirely according to the anatomical changes found at necropsy; yet when the type of each case, determined at necropsy, is compared with its corresponding clinical history—although from the symptoms alone these cases may often be (as we shall see) at first difficult to differentiate and classify—they may still be easily separated from one another during life, the one being recognized by its specific blood serum reaction and the other by the presence of amœbæ dysenteriæ in the stools; and, moreover, when we study more carefully their courses we may see that the clinical cycle of the disease, as well as the onset, is generally somewhat different in each type.

It is the principal object of this paper to determine by an analysis of our cases in how far our impressions may be justified and to compare our results with those of the numerous observers in other countries.

Let us first turn our attention to a summary of the different micro-organisms described in dysentery before considering further these two types of dysentery.[1]

HISTORY OF THE MICRO-ORGANISMS DESCRIBED IN DYSENTERY.

As early as 1883 Prior (Centralblat f. klinsche Medecin. 1883, p. 273) described micrococci singly and in clumps in the stools, in the mucous secretion of the intestine, and in the mucous tissues themselves in dysentery. The bacillus subtilis he also found, but in small numbers, in the stools, and not in the mucous secretion of the intestine or lying in the tissues.

In 1886 Hlava (Casop. lék cesk *v.* Praze, 1887, p. 70) believed dysentery to be a disease caused by micro-organisms. He studied dysentery bacteriologically and succeeded in isolating 19 different organisms from the intestinal canal of patients suffering from this disease. He finally became convinced that no specific organism was to be regarded as the cause of dysentery, and he was unable to produce dysentery or anything resembling it in animals with the organisms he found. Therefore he concluded that bacteria are not the cause of dysentery.

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[1] We fear that our literature is far from complete; we have as yet no large medical library in Manila for reference.

Klebs in his book (Die allg. Path. v. 1, Jena, 1887, p. 206) describes an organism which he states he believes to be the cause of dysentery. This organism is a small bacillus which forms small whitish dot-shaped colonies on gelatin. No spore formation could be observed. In stab cultures in gelatin they neither liquefy nor grow into the depth of the media. This organism was isolated from the intestinal glands of dysenteric cases, but was never found in the intestines of those suffering from other diseases. Inoculation experiments in dogs and rabbits gave no positive results.

Ziegler (Path. Anatomie, Jena, 1892) considers at least some of the epidemic forms of dysentery due to bacterial infection, and he thinks that certain epidemics have been so intimately associated with bacterial invasion of the intestine that the causal connection of the micro-organisms with the disease can hardly be doubted. In a local outbreak occuring in Germany he observed a small bacillus partly scattered, partly occurring in masses within the glands, glandular epithelium and connective tissue of the large intestine. Their multiplication in the tissue was followed by inflammation, tissue necrosis, and degeneration.

Chantemesse and Widal (Acad. de Med., 1888) found in the walls of the large intestine and in the mesenteric glands and spleen of a man who died of dysentery, and in the stools of five persons suffering from tropical dysentery, a bacillus which they consider specific and probably the cause of dysentery. This organism they described as a short rod with rounded ends, which does not stain well, and has but slight motility. On agar plate cultures the colonies appear first as small white specks, which often assume a yellow color, but in a few days the yellow color vanishes, causing the colonies to become white and granular. Under a low power of the microscope these colonies have often a darker center and a lighter, sharply circumscribed, periphery. Gelatin cultures show no liquefaction of the media. This bacillus was found when injected in pure cultures into guinea pigs, either by the mouth or directly into the large intestine, to give rise to a diphtheritic-like inflammation of the mucous membrane of the large intestine. It is supposed by some observers, however (Baumgarten, Kartulis, and others), that this organism was only a variety of the bacillus coli communis which had acquired special virulence.

Veillon and Jayle (Semaine méd., Par., 1891, p. 13) found in liver abscesses and in the intestines of those sick with dysentery the bacillus coli communis.

Maggiora (Archiv. Ital. de Biologie t. xvi, 1891) studied an epidemic of dysentery in which only three deaths occurred out of 2,001 cases. The duration of the disease was from six to twelve days. He examined the fæces microscopically in 20 cases and only found the amœba in 1. In 11 cases he examined the stools bacteriologically. The bacteriological examinations showed the bacillus coli communis always present in great numbers, and in most of the cases the proteus vulgaris was also present, but not in great numbers; in 6 cases the bacillus fluorescens liquefaciens was found; in 2 staphylococcus pyogenes aureus was found; in 1 staphylococcus pyogenes albus; in 5, bacillus pyocyaneus in small numbers. The colon bacillus and bacillus pyocyaneus were found to be very virulent. Maggiora inclines to the belief that perhaps bacillus coli communis developed an abnormal virulence and caused the above epidemic.

Grigorieff (Mikro-organismen in dysenterie centralblat. f. Bakteriologie xii, 1892) found in the fæces of 10 dysenteric cases, as well as in the organs of those who had died from dysentery, a particular bacillus in every case examined, and he believes this bacillus to be identical with the one described by Chantemesse and Widal. On gelatin plate cultures the colonies magnified under a low power appear as bright, somewhat seed-like, pale yellow disks. The superficial colonies are larger than those at a lower level. These disks gradually expand, and after five days concentrated rings are formed. Stab cultures in gelatin show after twenty-four hours a somewhat broad, furrowed, gray band, somewhat resembling a goose feather (Gansefederfahne), with no liquefaction of the media. Upon agar slants there appears after twenty-four hours a light grayish-white layer, externally thinner than internally. Upon potato there appears after forty-eight hours a thick, grayish-yellow growth, with a glistening surface. The bacilli decolorize by Gram's method. Various experiments with animals were always unsuccessful.

Ogata (Centralblat. f. Baktr., 1892) studied an epidemic of dysentery occurring in the province of Oita, in Japan, and found no amœbæ in the stools of the cases examined. In the fresh discharges of 15 cases he succeeded in isolating from 11 of the 15, as well as from the ulcers of a case which had died of dysentery, short, fine bacilli, measuring about 1 μ in length, with rounded ends and active movement. This organism did not decolorize by Gram's method. In agar cultures greenish-yellow colonies were formed. In gelatin cultures the media was liquefied. When introduced into guinea pigs by os or rectum they caused ulcerative processes in the large intestine. Ogata thinks that this organism, discovered by him, is probably the cause of the dysentery in Japan. He also found, according to his report, in the discharges from the large intestine of all of the 15 cases examined, as well as from the ulcers in the large intestine, short bacilli, which do not liquefy gelatin, decolorize by Gram's method, and which were not pathogenic for the animals experimented upon.

Zancarol (Dysentérie et abces du foie, Progrès médical, Alexandrie, 1893) believed that both dysentery and liver abscess have the same etiological factor, both being produced by a streptococcus. In the blood of 8 persons suffering from liver abscess he found streptococci, and in 6 liver abscess cases out of 9 he found streptococci either microscopically or in cultures. In one case staphylococci were isolated, and on another occasion he could not determine whether staphylococci or streptococci were present. He concluded, therefore, that both dysentery and liver abscesses are due to streptococci.

Laveran (Compt.-rend. Soc. de biol., Par., 1893, p. 875), in a study of a limited dysenteric epidemic in Paris, examined 10 cases and only found the amœba in one. In all of the 10 cases examined he found a bacillus in great numbers which could not be regarded as entirely distinct from bacillus coli communis. He believes that at this stage of our knowledge it is impossible to form a definite judgment of the etiology of dysentery in Europe.

Calmette (Archives de méd. nav., Sept., 1893), who studied the epidemic disease at Saigon, came to the conclusion that of all the bacteria present in the stools the bacillus pyocyaneus was the one of greatest pathogenetic importance, and the only one in his opinion capable of reproducing in animals the lesions of dysentery. The pathogenic effects of this organism are, however, he states, increased by the presence of streptococci. He attaches little importance to the amœba as the cause of the disease.

Vivaldo (Riforma med., 1894, No. 138), during the epidemic in Padua, examined the stools in 20 cases of dysentery, but never found the bacillus described by Ogata as the cause of dysentery. He believes that the amœbæ have a specific action in preparing the ground for the action of the micro-organisms.

Arnaud (Compt.-rend. Soc. de biol., Par., 1894, p. 239) examined 60 cases of dysentery in tropical climates and concluded that bacillus coli communis, or a pathogenic variety resembling it biologically very much, was to be regarded as the cause of dysentery. The more severe the termination of the disease the more frequently was this bacillus found in pure cultures and the greater was its virulence. Five dogs inoculated by way of the rectum showed characteristic ulceration of the large intestine.

Bertrand and Baucher (Gaz. hebd., Oct. 6, 1893, and Apr. 4, 1894) studied an epidemic of dysentery among the troops stationed at Cherbourg. They found a number of bacteria present in the dysenteric discharges examined, viz, a septic anaërobic vibrio, bacillus coli communis and another organism which seemed to be a variety of it, bacillus pyocyaneus, bacillus fluorescens, staphylococcus pyogenes aureus, albus and citreus, two varieties of streptococci and bacillus œdematis maligni. They concluded that no one of the micro-organisms found by them can be considered as the specific agent of the disease, but they ascribe to the bacillus pyocyaneus the most important part in the causation of the dysentery. Their observations lose considerable in value from the want of evidence as to the presence and deposition of the organism in the tissues. In the fæces from patients with the chronic dysentery of tropical climates they further found practically the same organisms as they met with in the acute disease in France, but they conclude that in the tropical form the bacillus coli communis, more or less modified, predominated.

Silvestri (Gior. d. r. Accad. di med. di Torino, 3, xlvii, 1894), in studying an epidemic of dysentery in Turin, found in the bacteriological examinations he made of a number of the stools a large diplococcus. This organism when injected in pure cultures into the rectum of dogs and cats caused severe catarrh of the intestine. The process was more marked in the cats.

Kruse and Pasquale (Untersuchungen über Dysenterie und Leberabscess, Zeitschr. f. Hygiene Bd. 16, Heft 1, 1894), in discussing the bacteria found in association with amœbæ in dysentery, state that in 100 cultures from fresh dysenteric stools and the contents of liver abscesses and (post-mortem) from several organs, there were found streptococci of various species in 50 per cent, typhoid-like bacilli in 25 per cent. the bacillus pyocyaneus, a bacillus resembling the pseudo-diphtheritic bacillus, and the staphylococcus pyogenes. None of these organisms were present so constantly or in such numbers as to suggest a specific relation to the dysenteric lesions. Post-mortem the bacteria were always most numerous in the blood from the portal vein. Inoculation experiments into the rectum of cats with these organisms gave a negative result. The authors do not conclude that the organisms found in association with the amœba possess no pathogenic properties whatever, but rather that they can not be regarded as the primary agents in this form of dysentery.

Chaltin (Centralbl. f. innere Med. Aug., 11, 1894), in an investigation of dysentery, found that as a rule the dejections from these cases contained the bacterium coli commune and proteus vulgaris. He failed to find the amoeba in all of 325 cases examined by him, and concluded that these organisms are of no particular significance in temperate climates.

Celli and Fiocca (Annali dell' Istituto d' igiene sperimentale di Roma, 1895) made some preliminary communications about their study of dysentery. They obtained their material from sporadic cases observed in Rome, Tivoli, and Siena, and from epidemics that occurred in Bellino and Forli. They also studied cases of dysentery from Alexandria, Egypt. In all, they studied 62 cases. They concluded that amœbæ, especially the amœba coli, are not to be regarded as a direct cause of this disease. They injected dysenteric stools free from amœbæ into cats by the rectum and produced dysentery. They conclude that dysentery is caused by a specific variety of the bacillus coli communis, which they state is always present in the stools of dysenteric patients. The organism bacillus coli communis, which is generally nonpathogenic, they state, can acquire, under certain circumstances, very virulent properties; that in the bowels it is often associated with a bacillus like that of typhoid, as well as with a streptococcus, and they assert that, introduced into animals by the mouth or injected into the rectum, either singly or all of these organisms, but particularly, however, when in combination, excite dysentery. They consider bacterium coli dysenteriæ to be but a variety of bacterium coli commune, a variety that, being acted upon by other bacteria, assumes a most virulent character. During this process the almost harmless bacillus is converted into the most virulent bacterium of dysentery. The latter organism then secretes a powerful toxin that is capable of producing typical dysentery when given through mouth or rectum or injected subcutaneously into the connective tissue of animals. This dysenteric toxin may be precipitated by alcohol from bouillon cultures, and is soluble in water.

The next year Celli (Ann. d' ig. sper., Roma, 1896, p. 203) published more extensive communications. He invariably succeeded in isolating B. coli dysenteriæ from dysenteric cases. He considers that dysenteric infection is primarily caused by a toxin produced by this organism. This toxin, he states, may have a pyogenic, dysenteric, or marantic effect, and is to be found in the blood of marantic, dysenteric men and animals. With gradually increasing doses of this toxin animals may be given a high degree of resistance against the marantic or dysenteric, but not against the pyogenic action. This immunity is of short duration, however. The intestinal ulcers he states to be due to the pyogenic bacteria of the intestinal canal.

Bruno Galli Valiero (Centralbl. f. Bact., Jena, 1896, v. 20, p. 901) in the same year reported upon the etiology and serum therapy of dysentery. In one case of dysentery in Valterina he isolated an organism which measures 1.75μ, 2.6μ, or so short (0.87μ) that they resembled cocci. Plate cultures showed colonies which in a few days became of a greenish tinge. Gelatin cultures were slowly liquefied and milk in forty-eight hours was peptonized. Milk sugar was fermented, but the indol reaction could never be obtained in cultures of bouillon. The organism was not decolorized by Gram. Experimental dysentery was produced in chickens and dogs by inoculation. The serum of a dog immunized with this bacillus can protect guinea pigs and chickens against infection from it. Valiero believes that this bacillus, which he isolated, is identical with bacillus coli dysenteriæ of Celli, and is nothing more than a variety of bacillus coli.

Pottein, in 1897, isolated from the stools of a severe case of dysentery, in addition to the bacillus coli communis, a micro-organism which he calls the streptothrix dysenterica. The bacillus coli communis isolated possessed only moderate virulence. He concludes that in all probability the streptothrix dysenterica was the original irritating cause of the dysentery in at least this one case, and that he hopes it may be encountered again in other cases of dysentery.

In 1898 K. Shiga (Centralblatt f. Bakt., Parasitenkunde und Infektionskrankheiten, xxiv. Band, 1898), working in Kitasato's laboratory in Tokyo, described a bacillus in connection with the epidemic form of dysentery occurring in Japan. He studied 36 cases and obtained a specific organism in 34. He reasoned that when the serum of a person suffering or having suffered from a certain disease has an agglutinating action upon a certain form of bacteria this organism has probably an intimate connection with that disease. Using this argument as an aid in his work, he isolated a bacillus which he believes to be the only organism of dysentery, at least of the kind prevalent in Japan. This organism he names the bacillus dysenteriæ. The blood serum in all of the 34 cases of dysentery examined showed a positive agglutination for this organism. He describes the bacillus as a short rod with rounded ends, much resembling bacillus typhosus or the greater portion of the coli group. It is possessed with moderate motility, but flagella have not yet been demonstrated; neither has spore formation been observed. The organism decolorizes by Gram's stain.

Upon gelatin plates at room temperature there appear, after a few days, small round dots, which magnified under low power are slightly yellow and finely granular. After a few days they increase in size; the middle portion of the colonies then appears, under a low power, darker, while the outer zone appears brighter and more seed-like. The superficial and deeper colonies show no marked variation. In stab cultures of gelatin a whitish strand forms the whole length of the stab. The gelatin is not liquefied.

Single colonies upon slanted agar appear, after twenty-four hours in the incubator, moist, bluish, and partially translucent. After two days they present a combination of a middle dark and a peripheral bright, sharply defined zone.

The growth on glycerin agar is slightly more abundant than on ordinary agar. The organism grows on blood serum without liquefying it.

In the stab cultures of glucose agar there is formed along the whole line of the puncture a thick gray-white strand without the development of gas. Upon potatoes, after twenty-four hours in the incubator, there is hardly any perceptible growth, only the surface appears slightly shiny. After two days this changes to a yellow-brown. In the course of a week the growth is heavier and of a deeper brown color. Bouillon cultures show, after a day in the incubator, a somewhat intense cloudiness, with a moderate precipitate. No pellicle is formed on the surface. No indol reaction is present.

Litmus milk, after twenty-four hours in the incubator, appears reddish; otherwise, however, it undergoes no change. The milk never coagulates.

This bacillus was pathogenic for mice, rabbits, and guinea pigs when injected subcutaneously. Pure cultures injected into the abdominal cavity of a guinea pig caused death from general peritonitis, with hemorrhages in the intestinal wall and bloody mucus in the intestinal contents. In rabbits whole agar cultures introduced by way of stomach or rectum produced only temporary loss of weight.

We quote in detail the following experiments on cats and dogs:

1. A young cat was injected subcutaneously with one-half of an agar culture. Result: Weakness, loss of appetite, death within four days. At necropsy plate cultures showed bacillus of dysentery from the point of inoculation, blood, spleen, and liver. Intestines normal.

2. A young cat was given an enema of weak ammonia water. Result, slimy stools. The following day the stools were examined and found free from bacillus of dysentery. A large quantity of dysenteric fæces was injected by way of the rectum. More slimy stools resulted, but bacillus of dysentery was not found. Death within three weeks. Intestines found normal.

3. Two cats (480 and 700 grams) were fed one-half a drop of croton oil in their food. Result, soft stools the next morning. No dysenteric bacilli found. The second cat was given a whole agar culture of bacillus of dysentery into the stomach. The first cat recovered from diarrhea the next day, while the second had slimy and gray stools. The diarrhea lasted a whole week; stools examined and bacillus dysenteriæ constantly obtained in culture. Death in four weeks. Loss of weight, 510 grams. Necropsy: Mucous membrane hyperæmically inflamed. From cæcum to rectum the whole bowel filled with mucus, or fæces covered with mucus. Bacillus dysenteriæ obtained from the cæcum and large intestine.

Cat fed with large quantity of bacillus dysenteriæ; no results.

It will be seen, then, that in only one cat which had been given croton oil previously was any pathological change in the intestine produced.

Shiga first satisfied himself that bacillus dysenteriæ did not exist in the stools of a small dog. He then introduced a whole agar culture of bacillus dysenteriæ into the stomach by means of a probe. Results: Next day the animal passed grey stools of soft consistency; bacillus dysenteriæ was present in abundance. On the third day the animal refused food; a yellowish watery diarrhea with vomiting occurred. On the morning of the fifth day, death. Dissection: Upper part of small intestine 50 cm. long filled with mucus. Intestinal wall showed several circumscribed hemorrhages, the largest, about 1 cm. in diameter. The large intestine mucous membrane was loosened up and covered with mucus. The rectum was relatively healthy and the other organs showed no change. From the mucus of the small intestine pure cultures of bacillus dysenteriæ were obtained. Cultures from the blood and other organs were sterile.

In conclusion of his experiments on animals Shiga states that whether he used dysenteric dejections or pure cultures of bacillus dysenteriæ he could not produce similar changes of the intestines as in human dysentery. The most favorable results were, he states, when he obtained hyperæmia and hemorrhages in the intestinal mucous membrane in guinea pigs (through intraperitoneal injections of pure cultures) and in dogs and cats by the injection of pure cultures by way of the stomach.

A small portion of a bouillon culture in which the organisms had been killed when injected into Shiga's arm caused rather violent local and especially general reaction as in severe cases of dysentery. His own blood serum showed agglutination for this bacillus in dilutions of 1 to 10 ten days after the inoculation.

Shiga lays stress upon the stage of the disease in which the organism occurs in greatest numbers in the stools; this being at the most violent period, clinically, of the dysentery. He states that pure cultures of the organism may then be obtained direct from the bloody mucous stools, besides a few colonies of colon bacilli, streptococci, and diplococci. When the stools become pus-like and then of ordinary feculent consistency the other bacteria constantly increase in numbers while the dysentery bacilli gradually diminish. From the dysenteric stools he obtained pure cultures of over ten varieties of bacteria, but with the exception of the bacillus of dysentery, none appeared constantly and none of these other organisms showed any constant agglutination with the blood serum of dysenteric patients. He never found this organism in the stools of healthy patients or in those suffering from other diseases (typhoid fever, 4 cases; acute diarrhea, 2 cases, and chronic diarrhea, 3 cases). In a case of beri-beri also this bacillus was absent. He studied 3 cases of dysentery at necropsy, and obtained from 2 this same organism from the intestine and also from the retroperitoneal glands. In both cases the bacillus coli communis was also obtained from the glands, and bacillus coli and other bacteria from the intestine. It is unfortunate that there is no detailed description of the anatomical lesions found at the necropsies, that the lesions might be recognized.

In 11 cases this organism gave negative results for agglutination with the blood serum of healthy individuals. The serum of 3 cases of typhoid fever, of 1 case of acute and of 2 cases of chronic gastric catarrh, and also of a case of beri-beri, all failed to agglutinate this organism. The serum of the calf, goat, rabbit, mouse, cat, guinea pig, chicken, and pigeon also failed to agglutinate it.

Shiga also describes 2 varieties of colon bacilli that were occasionally found in dysenteric stools, which sometimes showed agglutination with dysenteric serum as well as with the serum from normal cases. He found amœbæ in 5 of the 34 cases he examined and he thinks it is very probable that the balance of the cases also contained amœbæ.

Thus, when we review this literature we see that in the more recent work on the bacteriology of dysentery, in addition to Shiga, Kruse and Pasquale and Celli all found typhoid-like bacilli in the stools of dysenteric patients; while Ogata found, in addition to the organisms which he supposed to be the cause of the dysentery studied, an organism which he describes as a short bacillus, which does not liquefy gelatin and decolorizes by Gram's solution. This organism was found in the discharges of every case studied. When injected into animals it did not produce dysenteric changes.

Celli stated that his typhoid-like bacillus, as well as his streptococcus and bacillus coli were all capable of producing dysentery either singly or in combination. Kruse and Pasquale found typhoid-like bacilli in 25 per cent—that is, in 25 out of 100 examinations—and the question immediately suggests itself to us, Were all of these 100 cases of the same type of dysentery? We know from Kruse and Pasquale's report that a number of these cases were amœbic cases; but were they all of this type, and whether in these 25 cases in which typhoid-like bacilli were obtained there was not a difference in the anatomical picture at necropsy and some difference in the clinical histories in these cases from those of the remaining 75? At any rate, when we turn to our own dysenteric cases we find that we have obtained typhoid-like bacilli from the large intestine or contents thereof in 28 cases. When we come, however, to study the cases in which we have found these typhoid-like bacilli at necropsy we see that in not one of them were amœbæ found, and that the anatomical picture at necropsy, and often the clinical histories, were quite different in these cases from 97 other cases in which amœbæ were found post-mortem.

Let us now describe in detail this typhoid-like bacillus which we have found and the cases in which we have encountered it.

Morphology.—Bacilli with rounded ends which differ in morphology in various culture media. On agar cultures they generally appear as short rods with rounded ends measuring 1 to 3 μ in length and about 0.4 to 0.5 μ broad, occurring not frequently in pairs. In twenty-four-hour bouillon cultures the rods are always longer, often measuring 3 or 3.5 μ in length, occurring frequently in pairs; occasionally (particularly in old bouillon cultures or in fresh bouillon cultures made after many generations on artificial media) the rods may be seen even longer, and it is not infrequent then to observe filaments of several organisms. The organism possesses no capsule and does not form spores. No flagella have been demonstrated.

Staining properties.—They stain readily and evenly with ordinary aniline dyes and are easily decolorized by Gram's method, but not decolorized by alcohol except by prolonged treatment. Old bouillon cultures sometimes show slight irregularities in staining.

Cultural characters.—An ærobic and facultative anærobic very slightly motile bacillus. Spore formation has not been observed. It grows on the usual media both at room temperature and in the incubator.

On agar plate cultures, after twenty-four hours in the incubator, superficial and deep colonies develop. The surface colonies are round, of a distinctly bluish white tinge and delicate, measuring from about 0.5 to 1 mm. in diameter; under a low magnifying power these colonies are often nucleated, having a darker center with a gradually growing lighter periphery. They are granular with often a tendency toward central radiation of the granules. These colonies are generally round with even borders. The colonies in the depth are small, more yellowish in color, oval or round, and present nothing characteristic.

Often from the twenty-four-hour plate cultures made from the stools of acute dysenteric cases when the plates are held up to the light the colonies of dysenteric bacilli can be picked out from the colon colonies by their more delicate growth and by their bluish tinge. In older plate cultures the colon demonstrates that it is a heavier grower. From close observation of many plate cultures we have concluded that in twenty-four-hour plate cultures certain colonies of bacillus coli communis resemble the colonies of those of bacillus dysenteriæ so closely that they can not be told apart either by the naked eye or by a low magnifying power. On the other hand, colonies of the bacillus of dysentery never resemble certain common forms of colon colonies.

On agar slants with bacillus dysenteriæ a moderately heavy growth appears after twenty-four hours, bluish white by transmitted and whitish by reflected light. The growth is lighter than that of bacillus coli communis and sometimes even lighter than that of bacillus typhosis.

On glycerin agar the growth is about the same as on ordinary agar. In gelatin stick culture the organism grows along the track of the needle without liquefying the medium.

In glucose agar stick cultures there is never any production of gas. The growth occurs along the track of the needle and slightly on the surface about the point of inoculation of the medium.

Litmus milk is always slightly reddened after twenty-four hours. The red color does not change further and no other change occurs after one week.

Ordinary milk is neither coagulated nor peptonized, but appears unchanged, though the organism grows well in it.

Litmus lactose agar is apparently not changed after twenty-four hours. There is no gas formation.

In saccharose cultures there is no fermentation.

On fresh-potato cultures after twenty-four hours there is generally apparently no growth or only slight moisture about the track of inoculation; after three days there is a light straw-colored growth which gradually becomes heavier and a little darker by the end of a week. Cover slips show that the organism grows well on this medium. In bouillon cultures there is moderate clouding of the medium in twenty-four hours, with the formation of a light precipitate. No pellicle on the surface ever occurs. Dunham's solution is clouded in twenty-four hours with the formation of a slight sediment.

Neither in Dunham's solution nor in Smith's sugar-free bouillon is there any indol production.

The bacillus is pathogenic for mice, rats, and rabbits when injected either subcutaneously or intraperitoneally. White mice, when inoculated with one-half to 1 c. c. of a twenty-four-hour bouillon culture generally die within forty-eight hours, but may live three days. Post-mortem the organism may be obtained from the visceral organs, and from the heart's blood. When the same amount is injected intraperitoneally the animal dies generally in from ten to twenty-four hours. Post-mortem there is generally œdema of the abdominal walls and a little fibrin over the surfaces of the intestines. The organism may be obtained from the abdominal cavity, visceral organs, and heart's blood.

Manila gray rats when inoculated with one-half to 1 c. c. of a twenty-four-hour bouillon culture subcutaneously generally died on the third or fourth day. The organism may be obtained from the visceral organs, and sometimes from the heart's blood. When inoculated intraperitoneally with the same amount death takes place in from twenty-four to thirty-six hours. Post-mortem there is a little fibrin over the intestines. The organism may be obtained from the liver, and generally from the spleen and heart.

In rabbits subcutaneous inoculation of 1 c. c. of a twenty-four-hour bouillon culture generally causes death on the third day. At necropsy the vessels of the epicardium are injected; the vessels of the mesentery are also brightly injected; the gall bladder is swollen; there are small hemorrhages in the liver; the stomach and small intestine contain a small amount of mucus. The cæcum and large intestine are distended with apparently normal feces.

Intraperitoneal injection into rabbits causes death with a more marked peritonitis; otherwise the changes are the same as when the inoculation is made subcutaneously. The organism is found in greater numbers in the liver than elsewhere.

Four monkeys were fed for two weeks daily with a twenty-four-hour bouillon culture of bacillus dysenteriæ. Two of the monkeys were fed 10 grains of sodium bicarbonate previous to taking the bouillon culture. Three of the cases had at times a moderate diarrhea; at no time was there blood in their stools. Bacillus dysenteriæ was recovered from their stools. In the fourth case there appeared after about ten days' feeding a little mucus and blood in the stools for two days. Microscopical examination showed the trichomonas intestinalis, red blood cells and epithelial cells; no amœba nor bacillus dysenteriæ was obtained from the stools. The feeding was continued, but the stools became normal, and there was no further result.

Cats and dogs were injected per rectum with large amounts of fresh bloody mucus stools from acute dysenteric cases in which the bacillus dysenteriæ had been demonstrated. No dysentery was obtained and no change of note in the large intestine.

Cats were given enemas of bouillon cultures of bacillus dysenteriæ. Only slight diarrhea for a few days was produced. One cat was killed nine days after the injection. At necropsy there was no swelling of the mesenteric glands. On opening the large intestine the rugæ were seen well marked, the surface of the bowel bathed in a light layer of mucus. Microscopical examination showed only epithelium and epithelioid cells. There were no hemorrhages nor early ulcerations of the large bowel.

Subcutaneous injection of 1 c. c. into a Manila pony cause a rise of temperature in the neighborhood of 105° F. After a few days' illness the temperature decline to normal.

The virulence of the organism varies greatly in different cultures. The organism quickly loses its virulence when grown for any length of time on artificial media. Thus it will be seen that the disease acute specific dysentery can not be produced as such in animals any more than typhoid fever can.

We will now attempt to describe the type of dysentery which we have called acute specific dysentery.

ACUTE SPECIFIC INFECTIOUS DYSENTERY.

An acute infectious disease characterized anatomically by an extensive superficial necrosis of the mucosa, and by hyperplasia and hemorrhagic infiltration of the lymph follicles of the large intestine, with induration and thickening of its walls; by hemorrhagic swelling of the adjacent mesocolic glands; and often by parenchymatous changes in the other organs. The bacillus dysenteriæ is present in the acute stage of the disease, both in the discharges and in the superficial necrotic layer of the intestinal mucosa. Clinically the disease is marked by an acute onset, by very frequent mucous bloody stools, accompanied by intense tenesmus, and by an abrupt termination either in death (usually in from four to fifteen days), or by a gradual improvement, from which an early recovery takes place, or the disease may apparently pass into a subacute stage.

Etiology.—The disease seems widely spread over the Island of Luzon, but has occurred particularly among our troops in certain districts. The cases often appear in groups. It is not the rule to find sporadic cases. In one regiment in which in the neighborhood of twenty cases of typhoid fever occurred within a short space of time, there were almost twice that number of acute specific dysentery cases within the same space of time, as verified by the clinical histories and by the blood serum reaction. It is not possible for us to say just now if the disease is spreading to any great extent. The conditions under which our troops are living are very different from what they were last year, the troops all practically being in garrison now. The disease appears to occur more frequently toward the end of the rainy season. Thus in the latter part of July and in August and September, 1899, there were more cases which came to necropsy with this type of the disease than in the remaining nine months of the year together.

Infection.—Infection probably occurs, generally, through the drinking water. Milk is a possible means of infection, but not a practicable one here, owing to the scarcity of cows' milk in the Philippines and to the little use of other fresh milk as food. Infection through uncooked food (salads, cresses, etc.) can not be excluded. Undoubtedly infection is markedly influenced (as in cholera) by the existence of catarrhal troubles, irritating food, bad food, constipation, starvation, physical exhaustion, exposure to wet, etc. Infection with malarial plasmodia can hardly be considered an important predisposing factor, for it occurred in only two of our acute and in only one of our subacute cases.

The bacillus dysenteriæ.—The researches of Shiga have shown that a bacillus similar to, if not identical with, the one we have described above is probably the cause of a certain form of acute dysentery in Japan. Our own researches seem to show that this organism is probably the etiological factor in the acute specific form of dysentery which occurs here, and which we are attempting to describe. We have isolated this bacillus from 28 cases of dysentery. Nineteen of these cases came to necropsy, and all showed similar lesions of the large intestine, to be described below. This bacillus was isolated in 17 of our 21 necropsies on acute dysenteric cases. In our first acute case it was not sought for; in the remaining two it was not found. In our subacute cases it was obtained twice out of 11 necropsies. In two cases it was unfortunately not looked for. In the other seven it was not found. We shall refer again to the difficulty in finding the bacillus in the later stages of the disease.

The organism has been sought for in normal stools in the contents of the large intestines of those dying from other diseases than dysentery and in the fæces of monkeys and rabbits, but has never been encountered on any of these occasions. In 26 cases of dysentery which presented post-mortem an entirely different anatomical picture of the large intestine, and in all of which amœbæ dysenteriæ were present, this bacillus was carefully sought for and never found. Lastly, the disease has been produced in man on one occasion by inoculation with this organism.

Serum reaction.—The blood serum of the acute and subacute cases shows usually a marked agglutinative reaction for this bacillus. The reaction may be present as early as the third day, and is usually marked by the fifth or sixth. In one grave acute case which died on the fourth day of the disease, there was no reaction with the serum, either ante or post mortem, with this organism. The reaction may persist for several months, but usually seems to disappear in a shorter time. In one case of our series it persisted for six months, but has since disappeared.

General description.—The period of incubation probably lasts not over forty-eight hours. In one case to be referred to later, in which a pure culture of the organism was swallowed, symptoms of the dysentery began to appear after twenty-four hours. The onset of the disease is usually abrupt, there being no prodromal symptoms generally. Often a patient goes to bed feeling perfectly well. During the night he is suddenly attacked with dysentery, and it is not infrequent for these cases to have from 20 to 40 stools during the night. The stools at first contain a small amount of mucus. This mucus rapidly increases in amount, however, and soon becomes blood streaked. Generally within forty-eight hours, or a shorter time, the stools consist of nothing but reddish, bloody mucus. Microscopically these discharges consist in the later stages of many red blood cells, leucocytes, epithelial cells, and large epithelioid cells. No amœbæ are present in unmixed infections. The movements increase in frequency until finally there appears to be no control whatever over the sphincter ani, and the patient is almost continually on the bed pan or pad. The straining and tenesmus are often excessive. Toward the end the movements become less frequent, and may cease altogether shortly before death. Extensive hemorrhages are very unusual, but occasionally occur, always mixed, however, with more or less mucus. Excessive thirst is usually a prominent symptom. The tongue is generally coated with a whitish fur.

Fever.—The temperature is very irregular and variable, though almost always there is some pyrexia present. It may often reach 103° or 104° F. or it may not rise above 102° F. Just before death the temperature may rise rapidly or it may fall as rapidly to a subnormal point. The latter is always a very unfavorable sign.

The blood changes are not constant. There may be a moderate leucocytosis, but in the rapidly fatal cases often the number of leucocytes is not increased. The red blood cells in the first forty-eight hours are often increased in number, doubtless due to the early loss of water through the bowel; but shortly after the appearance of blood in the stools, notwithstanding this concentration of the blood, the blood count from the corresponding loss of red cells may fall below 4,000,000 to the cubic millimeter. Differential counts show that when a leucocytosis occurs it is the polymorphonuclear variety of white cells which is increased in number.

Pulse.—The pulse in the early stages of the disease is in the neighborhood of 100. As the disease progresses, particularly in unfavorable cases, the pulse becomes very rapid and may reach 150 or more. The extremities become cold, and the patient generally dies in coma from cardiac exhaustion.

Cardiac complications are rare. Neither acute endocarditis nor pericarditis has occurred in any of the cases studied. In the grave cases the sounds early become rapid and feeble and running. They soon lose their normal rhythm and approach that of embryocardia.

Nausea and vomiting are also somewhat uncommon, but occasionally occur, particularly in the earlier stages of the disease. Acute gastritis was found to be present in one subacute case at necropsy. There is often abdominal tenderness, particularly about the region of the colon, on deep pressure. No particular part of the colon appears constantly more tender than the rest. The abdomen is generally not distended. The spleen is generally not enlarged.

Respiratory system.—Pulmonary complications have been occasionally present. Lobar pneumonia occurred in one subacute case, and broncho-pneumonia in three acute and one subacute case. Acute bronchitis and fibrino-purulent pleurisy have been found each once in two of the acute cases of dysentery.

Nervous system.—There is no complaint of intense headache. Delirium may occur toward the close, particularly in the prolonged fatal cases. Convulsions have not been noted in any case, nor has neuritis or paralysis been observed as a sequel.

The urine is always decreased in amount, and may contain a small amount of albumin. Retention is often an early symptom. The diazo reaction does not occur.

Acute glomerular nephritis has been found post-mortem in one case.

In none of our cases has the liver been found much enlarged or tender. It is perhaps hardly necessary to mention that liver abscess has not been found in this form of dysentery.

Recovery from the most severe form is rare; in those cases which recover, the loss of weight may be very marked; a loss in the neighborhood of 20 or 30 pounds may occur within two weeks. The patients, after the acute form, are generally left in a weakened state. After convalescence has been established, they do not seem to suffer from dyspeptic or intestinal troubles. One attack does not necessarily protect, for one of our cases writes to us from a distance that he has had an attack similar to his first, which was a severe one and studied clinically by us. The second attack occurred five months after the first. Convalescence had been long established between the two. The most violent stage of the disease rarely lasts a week, though patients have lived for ten days in this stage. We have referred before to the fact that the cycle of this type is different from that of the amœbic type of dysentery. In the former it is brief; thus of our 21 acute cases which came to necropsy, 4 died on the fourth and 4 on the fifth day of the disease. None of our cases died before three complete days of illness. Ten others died before the fifteenth day. In those cases which recover, the urgency of the symptoms gradually diminishes, the stools gradually lessen, and the temperature declines. Recovery then may be early and convalescence well established by the end of the second week, or the disease may sometimes become subacute and last for months. One of our cases died on the sixty-fourth day of the disease. We regret that we have not as yet studied clinically this subacute stage as carefully as we should wish. These patients are usually poorly nourished, and have thin, bloody mucous stools from time to time—often not over from 3 to 5 in twenty-four hours. These stools in unmixed infections do not contain amœbæ. The blood serum of these cases shows a well-marked agglutinative reaction with the bacillus dysenteriæ, and sometimes an agglutinative reaction with certain colon bacilli, particularly for varieties of colon which show feeble power to ferment sugars, and which only faintly redden litmus milk without coagulating it, and which perhaps should be more correctly referred to as para-colon bacilli. These subacute cases, with their serum reactions, will be more fully described in a later paper.

Association with other diseases.—In 2 cases of the acute form of this dysentery there has been concurrent infection with malarial fever—on one occasion with the æstivo-autumnal type, and on the other with a single tertian infection. One subacute case was associated with a single tertian infection also. In another subacute case at necropsy there was a pigmented malarial spleen, but no parasites were present. In none of the other cases were malarial parasites found. So much has been said about malaria as an exciting agent in dysentery that we take occasion to emphasize the fact that it did not play an important part as a predisposing factor in our cases in this form of dysentery.

MORBID ANATOMY.

Abdominal cavity and intestines.—On opening the abdominal cavity the intestines externally may appear at first sight almost healthy. In a large majority of cases, however, the mesenteric vessels of the large intestine near the bowel are injected. The lymph glands lying close along the upper end of the rectum and the sigmoid flexure, which are normally hardly visible or palpable, are swollen to the size of from 10 to 15 mm. in their long diameter, are generally bright red, and on cut section hemorrhagic. No areas of necrosis are visible. The other lymphatic glands extending along the large intestine may throughout show these same swollen hemorrhagic changes, or they may along the transverse and ascending colon show only considerable hyperæmia. The group running toward the head of the pancreas seems particularly likely to be involved. The other mesenteric lymphatics are often only moderately swollen, and sometimes show slight hyperæmia. We have not noticed either any constant marked distention or contraction of different portions of the large intestine.

The serous surfaces of the large bowel are generally injected. The serous surfaces of the small intestine may be moderately injected or appear almost normal. The submucous and muscular coats of the large intestine are œdematous and swollen. The blood vessels of the submucosa are injected and in places diffuse hemorrhages have occurred in their regions.

On opening the intestines the whole of the large intestine is seen to be involved from the cæcum to the anus. Occasionally the process extends for 10 or 15 cm. into the lower end of the ileum. In regard to the starting point of the infection, we can not say, from the pathological changes post-mortem, in what part of the intestine the morbid process probably begins. The process seems a little more acute along the lower part of the descending colon and the sigmoid flexure, judging from the fact that the glands of the lymphatic chain which lie close to the bowel are generally more hemorrhagic than the other lymphatic glands of the large intestine.

In no text-book at hand can we find a description of this form of acute specific dysentery as we see it here. In the most acute cases (death after three or four days' illness) the mucous membrane of the large intestine presents in general a reddened, swollen, puffy appearance. There is a superficial necrotic mucous layer which generally extends over the mucosa throughout the large bowel, and sometimes for a distance of 10 or 12 cm. into the ileum. This necrotic layer consists of mucus, redblood corpuscles, leucocytes, epithelial cells, many large swollen epithelioid cells, and bacteria. No amœbæ are found. If one brushes the mucous layer lightly aside with the finger the bright-red injected appearance of the intestinal wall becomes more plainly visible. Dotted here and there throughout are small, diffuse, bright-red hemorrhages, with irregular margins measuring 2 to 4 mm. in diameter, or even more. The solitary follicles are generally swollen and raised, and of a bright-red color. Here and there scattered among them bright-red, sharply circumscribed small purpuric spots may appear. Occasionally the background of the intestine may be described as though covered with a bright-red eruption, but with darker red hemorrhagic points scattered over this background. In the acute cases no definite ulceration takes place, but only a superficial general necrosis of the mucosa.

Small intestine.—As has been stated, the serous surfaces may be moderately injected or appear almost normal. On opening the small intestine the mucous surface throughout may be normal, or more commonly the mucosa in the lower portion of the ileum is more or less reddened. In about one-third of the cases (7 of the 21 acute), however, the lower 10 or 15 cm. of the ileum is extensively involved. When this is so this portion of the intestine presents in general the same reddened hemorrhagic appearance and is covered with a necrotic mucous layer as in the large bowel. There is not the œdema and thickening of the intestinal walls here, however, as observed in the large intestine. The Peyer's patches are only moderately or not at all swollen; the solitary follicles may be swollen (measuring 1 or 2 mm. in diameter), raised, and hemorrhagic. The process gradually fades until usually about 15 or 20 cm. above the valve the mucosa appears normal. The process is never so well marked in the lower end of the ileum as in the large intestine. In only one case was there found a sticky, fresh, fibrinous peritonitis, with fine filaments of fibrin, particularly over the sigmoid flexure and upper part of the rectum.

The other organs show no constant changes.

Spleen.—The spleen is generally not enlarged and shows no constant pathological change. It was moderately swollen in 5 acute and in 2 subacute cases. In 4 of these 7 the enlargement was probably due to the coexisting malarial infection.

Liver.—The liver is not generally either hyperæmic or swollen. In only 1 case was it congested, and in another case slightly enlarged. In 2 cases there were small superficial hemorrhages beneath the capsule.

In no case has liver abscess been present. In those cases which live for more than a few days the liver shows parenchymatous changes. In the subacute stage it may show early fatty degeneration.

Kidneys.—The kidneys often show injection of the surface vessels and cloudy swelling. Acute glomerular nephritis was present in the 1 subacute case. The dysentery was associated with chronic interstitial nephritis in another single subacute case.

Stomach.—Acute gastritis was present in only 1 subacute case. The heart muscle showed parenchymatous changes in 3 acute and in 1 subacute case.

Respiratory system.—Lobar pneumonia was present in 1 subacute case. Broncho pneumonia was present in 3 acute and in 1 subacute case. Table III shows the more common changes in all the dysenteric necropsies.

TABLE III.

[Total number of necropsies, 271.]

Necropsies.	Total number.	Liver abscesses.	Acute general peritonitis following perforation of intestines.	Typhoid fever.	Malarial fever.	Pigmented malarial spleen.	Acute gastric catarrh.	Chronic gastric catarrh.	Lobar pneumonia.	Broncho pneumonia.
Dysentery	111	14	13	3	6	6	3	8	2	9
Acute specific dysentery	21	......	......	......	2	......	......	2	......	3
Subacute specific dysentery	11	......	......	......	1	1	1	1	1	1
Amœbic dysentery	79	14	13	3	3	5	2	5	1	5

Necropsies.	Acute pleurisy.	Chronic adhesive pleurisy.	Congestion and œdema of the lungs.	Acute nephritis.	Chronic nephritis.	Cloudy liver.	Cloudy kidneys.	Fatty liver.	Fatty kidneys.	Cirrhosis of liver.	Enlarged spleen.
Dysentery	3	25	16	2	7	36	21	26	7	5	15
Acute specific dysentery	1	......	4	......	......	8	5	1	1	......	5
Subacute specific dysentery	......	7	1	1	......	7	4	3	3	......	2
Amœbic dysentery	2	18	11	1	7	21	12	22	3	5	8

As has been stated, the bacillus dysenteriæ may be obtained from the superficial necrotic layer overlying the large intestine, from the superficial layers of the mucosa itself, and exceptionally (in 2 cases) from the hemorrhagic mesocolic glands.[1] The organism has not been found elsewhere in the body.

In the subacute form the mucosa of the large intestine has lost its bright-red look. The solitary follicles are more swollen, sometimes measuring as much as 5 or 6 mm. in diameter, are raised, hemorrhagic, and of a dark-red color. Irregular dark hemorrhages may be seen in their neighborhood. The surface of the bowel is very uneven, due apparently to the irregular thickening of the mucosa. The mucosa may take on a marked mammillated appearance. The necrotic layer of mucus is much less profuse than in the acute stage of the disease. There are still no definite ulcers, but there are superficial erosions. Indeed, we have never seen anything in this form similar to the ulcerations present in our dysenteric cases in which the amœba dysenteriæ has been found present. There is not the same thickening of the intestinal walls seen in the acute cases. The submucosa and muscular coats seem to have lost some of their œdema. The lower end of the ileum was extensively involved in 4 of the 11 cases. In 1 of these the process extended for a distance of 85 cm. into the small intestine above the ileo-cæcal valve. In 3 other cases the mucosa of the lower end of the ileum showed only hyperæmia.

The parenchymatous changes in the organs are more marked than in the acute form. Fatty degeneration of the liver and kidneys were present in 3 of the cases.

PATHOLOGICAL HISTOLOGY.—*Large intestine.*—Sections of the large intestine show overlying the mucous membrane a necrotic layer of mucus, degenerating epithelial cells, a few large swollen epithelioid cells, red blood corpuscles, and leucocytes. The whole stains poorly; many cells are granular and have lost their nuclei; as one approaches the bases of the glands of Lieberkuhn the cells stain more deeply. Always bacilli and not infrequently cocci are present in this layer. The number of red blood corpuscles varies greatly with the time of the disease. In the most acute cases they may greatly overnumber the white corpuscles and epithelial cells. The surface epithelium of the glands has been destroyed; in some cases where the process is most severe the epithelium may be necrotic almost to the base of the glands. The mucous membrane or what is left of it is swollen, its capillaries are distended, and there are small extravasations of red blood cells in their regions. The mucosa shows extensive cellular infiltration and there are many leucocytes in both the inter and sub glandular tissues. The bacilli in the mucosa lie scattered or collected within the glands or between them or sometimes within the cells of the glands. When they are found aggregated there are often collections of leucocytes about them. Some of the cells in their neighborhood are granular and their nuclei stain poorly. Sections which are cut through a follicle show the follicle swollen, with often small hemorrhages into its substance; large epithelioid cells are sometimes present in the adjacent lymph channels; these are then often multinuclear; bacilli may be present in the follicles, when both circumfollicular and interfollicular infiltration may occur. In the mucosa we sometimes find in addition to bacilli dysenteriæ a fair number of cocci. These latter, however, are generally in the more superficial layers of the mucous membrane when present.

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[1] Since writing the above the organism has been obtained in cover slips and in pure cultures from the lymphatic glands of a third case of the acute type.

At the base of the glands of Lieberkuhn in the areolar tissue and muscularis mucosæ there are usually more extensive hemorrhages and a marked infiltration with round cells. Also in the upper portion (from within) of the submucosa there are extensive hemorrhages. In the lower portion of the submucosa the vessels are injected, but the hemorrhages not large or frequent. Where the thickening of the intestinal wall is more marked the hemorrhages and cellular infiltrations in the submucosa are more extensive. Often the tisues of the submucosa appear very œdematous. Sometimes there is an apparent increase in the number of the plasma cells in the upper portion of the submucosa when the infiltration seems most marked. Even in the muscular coats the œdema may sometimes be present, and in very severe cases infiltration may occur. The vessels of the peritoneal coat are injected, but there are generally no large hemorrhages. The bacilli may be found sometimes not only in the mucosa, but all through the areolar tissue, muscularis mucosæ, and submucosa down to the muscular coat. In their neighborhood when they lie in masses there is infiltration, and often the nuclei of the cells about them stain poorly and are granular.

The lymphatic glands.—Sections of the swollen hemorrhagic glands show the blood vessels greatly distended, and there are often extensive hemorrhages through the gland substance. The lymph spaces are frequently distended and contain albumin and a little fibrin; there may be many large epithelioid cells with proliferating and multiple, often crescent-shape, nuclei. Desquamation of the cells along the lymph channels may occur. The lymph follicles are proliferating and show an increase in the number of small round cells; often there are small hemorrhages present in the follicles. Only occasionally one sees a poorly staining and granular cell. In the surrounding tissues about the glands the blood vessels are distended. In only one case do the sections of the lymph glands show bacilli. (In the other case in which the bacillus was obtained by cultures from the glands, through some mistake no glands were saved for microscopical study.) In these glands small areas of necrosis have occurred. In these areas granular material is present; the nuclei stain poorly, but no nuclear fragmentation is apparent about the organisms. There is only moderate infiltration about these areas.

The liver.—Sections of the liver tissue show the liver cell often swollen and containing fine granules; the normal structure of many of the cells is lost. No areas of necrosis or of infiltration occur.

The kidneys.—Usually the vessels are injected, the tubules sometimes filled with red blood corpuscles. In the glomerular spaces it is not uncommon to find a little albumin with extravasation of red blood corpuscles. The cells of the tubules are generally swollen and granular.

The spleen.—Shows no definite changes with the exception that the pulp usually contains more red blood corpuscles than normally. The more detailed description of the microscopical pathology will follow later.

SERUM REACTIONS.—In 246 cases of diarrhea and dysentery, without regard to type, the blood serum was examined for agglutination with bacilli dysenteriæ. Of this number 71 cases had a positive agglutinative reaction with this organism in dilutions of 1 to 10 in twenty minutes.

In 192 of the 246 cases the stools were examined microscopically with the following results: In 56 the amœba dysenteriæ was found, often with the trichomonas intestinalis; in 4 the amœba coli; in 29 cases either the trichomonas intestinalis or the cercomonas hominis or both were present; in one case each the balancidium coli, the rhabditis embryos of the strongyloides intestinalis, ova of the anchylostoma duodenale, and ova of the trichocephalus dispar were found.

In 54 cases the stools were unfortunately not examined. This happened chiefly because the blood in these cases was often obtained from other hospitals at a distance. Many of them were undoubtedly amœbic cases. In 33 cases the serum showed no agglutinative reaction with bacilli dysenteriæ, nor were parasites found in the stools. Of these 33, 1 was a case of sprue previously seen by Manson, 3 turned out to be typhoid fever cases, and 2 gave positive serum reactions with bacillus coli communis. A small number of these 33 were probably amœbic cases, as sometimes it was impossible to make more than one examination of the stools among them.

All of the 71 cases of this group of cases which gave a positive agglutinative reaction with bacilli dysenteriæ either gave a recent clinical history or were suffering at the time from an acute dysentery. In many the dysentery was severe and ended fatally. In fact, in 21 of these cases bacillus dysenteriæ was sought for and obtained from the stools.

In only 3 of the cases with positive serum reactions for bacillus dysenteriæ were amœbæ found in the stools. In 2 others the trichomonas intestinalis was found, but no amœbæ. Of the cases which gave the serum reaction and contained amœbæ in the stools the first was undoubtedly suffering from amœbic dysentery at the time, but he gave the following history twelve days previously: "The attack came on suddenly; three other companions were taken sick with dysentery at the same time; all were drinking the same water and eating the same food at Pasig. The first twenty-four hours his bowels moved all night; he sat at the sink off and on for two days. He complained of swimming in his head and had bloody mucous stools. He entered this hospital twelve days later, stating that his dysentery was much improved." Numerous motile amœbæ, many containing red blood corpuscles, were found in his yellow mucous stools. Bacillus dysenteriæ was sought for but not found. The blood serum showed a distinct positive agglutinative reaction for bacillus dysenteriæ. He improved and disappeared from the hospital. In this case it does not seem clear just when the infection with amœba took place.

In the second amœbic case which gave an agglutinative reaction with bacillus dysenteriæ, the following clinical history of dysentery was obtained: "Perfectly well all his life until six months ago, when he was taken sick with diarrhea, which lasted for a week or so at a time, when he would get it stopped, but it would begin again in a short time. This intermittent diarrhea continued until a short time ago, when it became more severe, and he noticed that he was passing considerable blood; his stools became more frequent—10 to 15 in twenty-four hours—with more tenesmus and with headache and fever. He entered the hospital shortly after." The first twenty-four hours after entrance he had 20 stools, the second 26, and the third 16 stools. His temperature registered for two days 101° F., and then gradually dropped to normal. There was a leucocytosis on the second day of 10,000. The mucous stools showed many red corpuscles, epithelial cells, motile amœbæ, some containing red blood corpuscles and bacteria. The blood serum reaction (1 to 10 in fifteen minutes) with bacillus dysenteriæ was repeatedly obtained. Bacillus dysenteriæ was not sought for in the stools. The blood serum showed no agglutinative action with a colon bacillus obtained from his stools.

The third case which gave both a positive blood serum reaction with bacillus dysenteriæ, and had also amœbæ present in the stools, gave the following history of dysentery: "Three months ago he had a severe attack of acute dysentery with very frequent bloody stools containing mucus; this attack lasted about seventeen days; he gradually grew better and the blood began to disappear, but he states that he never has been free of diarrhea or dysentery since. About a month after his first attack of dysentery he had another severe acute attack; this lasted about eight days; he again passed large quantities of blood and mucus and states he had chills and fever at the same time. He has been passing blood and mucus off and on ever since." He entered the hospital here for his chronic dysentery and for cramps in his bowels. Since entrance he has had never more than 5 stools in twenty-four hours. Examination of the yellowish pea soup like stools shows large numbers of the trichomonas intestinalis, a fair number of motile amœbæ, a few containing red blood cells, a few red blood corpuscles and leucocytes. The blood serum shows a moderate but distinct agglutinative reaction for bacillus dysenteriæ, but none for the bacillus coli communis. The blood examination shows a few crescentic malarial parasites. The amœbic infection here occurred perhaps after the first acute attack of dysentery.

We regard these 3 cases as double infections with bacillus dysenteriæ and with amœba dysenteriæ.

In the first 120 cases of the 246 (in which there were 15 positive agglutinative reactions with bacilli dysenteriæ) the blood serum was also tried for agglutinative reaction with bacillus typhosis; with only 3 were there positive results. In the first of these cases the patient had typhoid fever four months before, and in the second case the patient had typhoid fever the previous year; in the third case we do not know whether there was any history of typhoid or not; we are endeavoring to trace the patient and obtain this information. In 46 cases in which the blood serum gave a positive reaction for bacillus dysenteriæ, the blood was examined for malarial parasites. They were found present in 9 cases. There were 4 tertian and 5 æstivo-autumnal infections. It will be seen again that malaria is apparently not a predisposing factor of importance in this form of dysentery.

The blood serum was also tried in 100 cases other than dysentery for agglutination with bacillus dysenteriæ, with the following results:

Disease.	Number of cases.	Previous hist. dysent.	Dilution.	Time.	Result.
		Cases.		*Minutes.*	
Health	12	1	1:10	30	1 partial. 11 negative.
Malaria	17		1:10	30	Negative.
Typhoid	20		1:10	30	Do.
Surgical	17	1	1:10	30	1 positive. 16 negative.
Venereal	4		1:10	30	Negative.
Rheumatism	6		1:10	30	Do.
Tuberculosis	3		1:10	30	Do.
Paraplegia	1		1:10	30	Do.
Abscess	3		1:10	30	Do.
Acute mania	2		1:10	30	Do.
Constipation	1		1:10	30	Do.
Diarrhea	7		1:10	30	Do.
Bronchitis	2		1:10	30	Do.
Dengue	4		1:10	30	Do.
Sprue	1		1:10	30	Do.
Total	100	2	1:10	30	(1)

(1) 1 positive, 1 partial, 98 negative.

Of these 100 cases, 1 gave a positive and 1 a partial reaction with bacillus dysenteriæ. The case that gave a complete reaction had never had typhoid fever. In 1895 he had severe dysentery in India, lasting about six months, and was unconscious during the first part of the attack. In 1898 he had a second attack of severe dysentery in South Africa; this attack lasted three weeks. At present he has no dysentery and has not had any for more than a year. The blood examination is negative for malarial parasites. The blood serum shows no agglutinative reaction for bacillus coli or for bacillus typhosis.

The case which gave a partial reaction for bacillus dysenteriæ (tried three times) gave also a negative reaction for bacillus typhosis and for bacillus coli. This patient gives a history of "an acute attack of dysentery one year ago which lasted about ten days. He passed much blood and mucus then and had many stools." He has had no bowel trouble since.

The dilutions of blood serum used may be considered rather low for the time limit, but these 100 reactions seem to show that the agglutination does not occur with ordinary blood serum in these dilutions.

In 97 of the cases the blood serum was tried for agglutination with bacillus coli communis or varieties of it (paracolon bacilli). Twelve of these gave a positive reaction in dilutions of 1 to 10 in twenty minutes. In 3 of these cases the blood serum also gave a positive agglutinative reaction with bacillus dysenteriæ; they were all clinically regarded as subacute cases of dysentery. In the 11 other cases in which the positive reaction for colon bacilli was obtained, 2 were cases in which there was clinically subacute dysentery, but no serum reaction for bacillus dysenteriæ and no parasites in the stools; 2 were cases of amœbic dysentery, and 5 were cases of a history of dysentery but with no dysentery at the time, and with the trichomonas intestinalis only in their stools. None of these last 11 cases, it is understood, gave a positive reaction with bacillus dysenteriæ.

So far we have not obtained the bacillus dysenteriæ from the intestine or from the stools in an amœbic case of dysentery; however, it has only been sought for in 26 cases as yet. We must remember, though, that the acute specific dysentery runs a rapid course, that cases either die quickly or get better rather quickly. And we have already pointed out that it may be very difficult, nay, we should say often impossile, to obtain bacillus dysenteriæ in any but the most acute stage of the disease. This only adds therefore to our chances of not finding it in amœbic cases and explains erhaps why we do not more often meet with double infections. Undoubtedly cases f these double infections with amœba dysenteriæ and bacillus dysenteriæ occur, as re evidenced by the 3 cases reported above in which the blood serum reacted positively to bacillus dysenteriæ and in which amœbæ dysenteriæ were found in the tools. But to find the bacillus dysenteriæ in an undoubted amœbic case we have ot been fortunate enough to do. We can not speculate upon the anatomical picture he large bowel would present at necropsy, for it is somewhat doubtful if bacillus dysenteriæ would attack an already diseased, thickened bowel, which we often see in amœbic cases, in the same manner it would a more normal mucosa. We do not doubt that these cases of double infection occur, however, and we shall hope still to meet with one. As has been stated, we have examined only 26 cases. The cases in which amœbæ dysenteriæ have been found in the stools and the blood serum gives a positive agglutinative reaction for the bacillus dysenteriæ are to be regarded as double infections, just as we have infections with other bacteria and parasitic diseases at the same time (for example, infection with the amœba dysenteriæ and bacillus typhosis, of which we have had 3 cases, and we know from Cunningham's work that in some cholera cases both the comma bacillus and amœba coli occur in the large intestine together). We do not believe that the two are to be taken as part of the same infection. The two parasites produce quite distinct lesions. The bacillus dysenteriæ produces its changes rapidly and has an acute cycle; the amœba dysenteriæ produces its lesions slowly usually, and death comes generally only after prolonged infection with this parasite.

In 56 amœbic dysentery cases in which amœbæ dysenteriæ were found in the stools, in only 3 cases was there a positive serum reaction with bacillus dysenteriæ. The two diseases, amœbic and acute specific dysentery, have a very distinct and different etiology.

Preliminary note.—We spoke in the beginning about the clinical cycle of amœbic dysentery being somewhat different from that of our acute specific dysentery. Thus in amœbic dysentery we often have an irregular course marked by periods of intermission and exacerbation of the diarrhea with a tendency to chronicity and the frequent occurrence of abscess of the liver. A gradual onset is characteristic of most of the cases, although the onset may occasionally be abrupt.

The periods of exacerbation and intermission of the diarrhea are characteristic of this form of dysentery. Are we not justified, then, in saying that the clinical cycle of the two forms of dysentery is generally different? Only a few days ago a patient was admitted who stated that he had been troubled with dysentery only for a week, and not before that time. He died the next day. Motile amœbæ were found in the stools before death and in the lesions of the large intestines post-mortem. There existed most extensive ulceration of the large bowel. Some of the ulcers were already healing. The process must have existed for a month or two at least, yet there was no other history than of a moderate dysentery of a week.

The amœbic cases.—Seventy-nine of our necropsies on dysenteric cases presented the lesions of amœbic dysentery. Almost every variation of the disease was observed. In general, many showed extensive thickening of the large bowel with numerous soft, deeply undermined, ragged-edged ulcers, often somewhat raised above the surrounding mucosa from infiltration of the underlying submucosa. The bases of these dissecting ulcers were formed of mucosa, submucosa, muscular tissue, or peritoneum. Other cases showed ulcers with only slightly undermined edges with smoother borders and clean bases. In many, both healing and fresh lesions were observed. The bowel wall was generally either bluish red or slaty gray. General peritonitis following perforation of the large bowel was present in 12 of the series. We can not attempt to describe these lesions of this type of the disease here. They have been carefully and fully described by Councilman and Lafleur (the Johns Hopkins Hospital Reports, Vol. II, 1891), Kruse and Pascale ("Untersuchungen uber dysenterie und leberabscess," Zeitschr. f. Hygiene, Bd. 16, Heft 1, 1894), Harris (American Journal of the Medical Sciences, 1898), and others. Anyone who reads their descriptions must clearly see that the anatomical picture we have attempted to describe, as found in our acute and subacute cases, is entirely a different one from the picture of amœbic dysentery. Their descriptions answer well for the pictures we have found in our amœbic cases and we have nothing to add to them.

In 68 of our 79 cases motile amœbæ were found in the lesions of the large intestines. (We emphasize the fact that the amœbæ were motile in these 68 cases; in other cases when the examination could not be made soon after death sometimes bodies resembling amœbæ, but not motile, were found. Swollen epithelioid cells, as is well known, often closely resemble amœbæ. Without movement it is sometimes very difficult to distinguish them from one another.) Fourteen of these cases showed, in addition to the lesions of the large bowel, liver abscesses, in which amœbæ were found in all but 2. In 1 the examination could not be made for nine hours after death. In 21 the lower end of the ileum was reddened. In 4 cases there were typhoid ulcers. In only 3 cases could the dysenteric process be said to be present. Then there were no ulcerations, but reddening of the mucus and swelling of the solitary follicles.

We were not able to study in all of the amœbic cases the bacteriology of the large intestine. The routine work of the laboratory has at times been such as to render this impossible. In 26 of these amœbic cases, however, the bacteriology of the large intestine was carefully studied and the bacillus dysenteriæ sought for, but not found in one case.

The bacillus lactis aerogenes and several varieties of streptococci and staphlyococci were the only other organisms found oftener than occasionally. We may add here that in none of these 26 cases did the blood serum give an agglutinative reaction with bacillus dysenteriæ.

We shall not be surprised to find bacillus dysenteriæ in connection with an amœbic dysenteric case, for we believe, as we have stated, that such double infections occasionally do exist, as shown by our blood serum reactions. When this occurs, however, we shall hope to find, in addition to the lesions of amœbic dysentery, those of acute specific dysentery, of course greatly modified, as one might expect in a case of concurrent infection with bacillus dysenteriæ and amœba dysenteriæ.

In none of these 79 cases of amœbic dysentery did the picture resemble the acute or subacute stage of our specific dysentery.

Councilman and Lafleur (loc. cit.) first called attention to the fact that amœbic dysentery is an anatomically sharply characterized form of the disease. Amœbic dysentery, they write, "is a form of dysentery which etiologically, clinically, and anatomically should be regarded as a distinct disease." We can only add that our own work bears out this statement. Yet it is with great difficulty that this view has held ground, and at present there is still much opposition to it. Thus when we consult two of our recent well-known text-books we find in Allbutt's System of Medicine, Volume II, page 408, 1897, that amœbic dysentery is recognized as a separate type of the disease and is described in a different chapter, and we find the statement under dysentery as an endemic infection, "that such specific organisms do exist in dysentery can hardly be doubted by those who have witnessed dysentery in its epidemic or endemo-epidemic manifestations; but until their existence is demonstrated, they can not be used as a basis of classification." On the other hand, when we consult the Twentieth Century Practice of Medicine, volume 16, 1899, we find that Sodré states, "To admit a dichotomy in the morbid process to recognize the existence of an amœbic dysentery and another not amœbic, seems to me absolutely unacceptable. Dysentery is one and one only, whether it be considered from an etiological, clinical, or anatomical point of view. * * * It is always the same, whether observed in the tropics as endemic and with marked tendencies to become chronic or in temperate regions as sporadic or epidemic." We can not agree with this statement. There are many instances to show that there may be more than one variety of dysentery. One of the most striking examples, clinically, of this, it seems to us, occurred in Futuna. Davidson (Epidemic in Futuna, Hygiene and Diseases of Warm Climates, Edin., 1893, p. 997) states that in 1893 an epidemic of dysentery started in Futuna, one of the New Hebrides group, being introduced by a vessel from Sidney (1,400 miles distant) which landed a Futunese woman and child. The child was suffering from dysentery. The disease soon spread and carried off one-quarter of the population, chronic dysentery being endemic in this island before the epidemic started. Our own experience has shown us that certainly at least two distinct forms of dysentery exist here. Both have probably the same predisposing factors (namely, dyspeptic conditions, particularly those caused by the ingestion of bad or irritative food, overripe or unripe food, sudden changes of temperature, exposure to wet and cold, etc.), but the one is caused by infection with the bacillus dysenteriæ and the other by infection with the protozoon amœba dysenteriæ. Also, the amœbic form is the endemic form of dysentery here, and the cases occur throughout the year. The specific form is more likely to appear as epidemic, and particularly in the late summer or fall of the year. At the present time, however, the troops at Calamba are suffering from a severe epidemic of this latter form.

Since there has been so much controversy in regard to the amœba as the cause of dysentery, let us review briefly the literature in regard to this parasite. According to Sodré (loc. cit.) Lambl was the first to note the presence of amœbæ in the contents of the intestines. He observed them in 1859, in Prague, in the stools of a child affected with dysentery. Lewis and Cunningham (Quarterly Journal Microsc. Soc..

Vol. XXI, 1881) found them in India in cholera stools and in other fæces. Loesch (Virchow's Archives 65), however, was the first to accurately describe them and give hem the name of amœba coli. He found them in the stools of a case of human dysentery in Russia in large numbers, and was able by rectal injection of the fæcal material loaded with amœbæ to produce ulcerations in the large intestine of dogs. In these ulcers he found large numbers of amœbæ.

The presence of amœbæ in the stools in diseases of the large intestine was corroborated by Sonsino, Normand, Grassi, Leuckart, and others. Koch (Koch and Gaffky "Arbeiten auss dem Kaiserl" Gesundheitsamte) then showed in several cases of Egyptian dysentery that amœbæ were to be found in the floors of the ulcers of the large intestine as well as in liver abscesses occurring in connection with dysentery. The regularity of these results was proven later by Kartulis (Virchow's Archives, 105–118; Centralblatt. f. Bakter., 207), by Professor Osler (Johns Hopkins Hospital Bulletin, 1890), by Councilman and Lafleur (Johns Hopkins Hospital Reports, 1891), by Kruse and Pasquale (Zeitschr. f. Hygiene u. Infekt., 16, 1), Harris (American Jour. Med. Sciences, 1898), and by others, who found them in a great number of Egyptian and American dysentery cases as well as in liver abscesses associated with some of these. Councilman and Lafleur stated that the name "amœba coli" given to the parasite by Loesch was not distinctive, for it seemed to them very probable that there were a number of species of amœba, which under certain conditions and in certain localities might inhabit the colon. They, therefore, proposed the name "amœba dysenteriæ" for it. On the other hand Ogata (Centralblatte f. Bakt., 11) and Maggiora (Ibid., 11) failed to find amœbæ in numerous cases of Japanese dysentery. Laveran (Archive de Med., 1893), Calmette (Archiv. de Med. Nav., September, 1893), Gasser (Archiv. de Med. Experim. et d'Anat. Path., 1893), Bertrand and Baucher (Gaz. Hebd., 1893 and 1894), Chaltin (Centralblat. f. Innere Med., 1894), and others also often failed to find them. Schuberg (Centralblatt. f. Baktr., 13), concluded that the abundance of the amœba in dysentery was the effect and not the cause of the disease. The ulcerations he states "afford this dweller of the intestine more favorable conditions for development." Cassagrandi and Barbagallo (Riecerche Biolog. e Clin. sul ameba coli Boll. de. Accad. di Catania, 1895) go so far as to say that the rôle of the amœba in a dysenteric intestine is to combat the microbe and "that they are a true guardian to man's health." The authors feel drawn to make this statement because they observed that amœbæ absorb bacteria at times and that bacteria are often rare in their neighborhood, in the ulcerations of the large intestine. The assertion that was first made by Cunningham (loc. cit.), viz, that amœbæ were found in other intestinal diseases as well as in normal stools, was demonstrated without doubt by the experiments of Grassi (Significo patolog. dei protozoi parasitti dell'uomo. Rendiconti Accad. Linc. Rom., 1888), Kruse and Pasquale (loc. cit.), and Schuberg (loc. cit.). However, Kartulis in reply to Grassi's communication asserted that the amœbæ found in Egpyt by him were not identical with those found in the fæces of healthy individuals in Italy. Kruse and Pasquale clearly recognized the difference between these two forms of amœbæ. Inoculation of dysenteric fæces containing amœbæ dysenteriæ into the rectum of cats has given positive results in the hands of Loesch (loc. cit.), Hlava (Centralblatt. f. Baktr., 1887), Kartulis (loc. cit.), Kovacs (Zeitschr. f. Heilkundr., Feb., 1893), Quincke and Roos (Berlin Klin. Woch., No. 45, 1893), and Kruse and Pasquale (loc. cit.). Stools in which the amœba was not present gave negative results. Nevertheless, to the objection made that it was the bacteria in the stools which caused the ulceration of the large bowel and not the amœbæ, Kruse and Pasquale injected into two cats the contents of two different liver abscesses containing motile amœbæ, but sterile as regarded bacteria by both cover slips and cultural tests. In both of these cases dysentery with ulcerations in the large bowel was produced. They also, in order to learn the importance of different varieties of bacteria which had been found in dysenteric fæces and organs, injected six different varieties of organisms into the rectum of cats. In five cases the results were negative. One experiment which had been made with streptococci resulted in the death of the cat, although no dysentery was produced, from a clear septicæmia. They also found that the amœbæ of nondysenteric stools when injected into cats produced no lesions and no dysentery. Roos (loc. cit.) in six cases performed with nondysenteric amœbæ obtained the same result, while in twelve experiments with dysenteric amœbic stools which had been injected partly by os and partly per rectum he obtained six cases of dysentery. Celli and Fiocca (Annali deli Instituto d'igiene sperimentale di Roma, 95) have made the statement that they have succeeded in breeding the amœba of dysentery, the amœba of the normal intestine, and many other varieties, but still not free from bacteria (comp., p. 601). Their statements are not convincing in regard to amœba dysenteriæ when one looks at the description and diagram which they give. These amœbæ measured only from 4μ to 10μ in diameter, and were therefore of so small a size that they are hardly to be classified as dysenteric amœbæ. Dysenteric amœbæ may vary from 10μ to 50μ, but hardly below 10μ. They are generally considerably larger. Also these authors claim that when the dysenteric amœbæ were injected into the rectum of cats they obtained no results, but that positive results were obtained by the injection into cats of stools free from amœbæ. We are convinced that Celli and Fiocca were not always working with amœba dysenteriæ. Moreover, on page 212 of their work we find that in the one case in which living amœbæ took part there was "un po piu sanguinolenta," as in the other three cases in which the amœbæ were killed. It is just this quality, as Flügge has remarked, which often characterizes this dysentery. The other varieties of amœbæ Celli and Fiocca have bred from intestinal contents, the authors themselves confess, are entirely different from amœbæ coli. This only the more suggests that probably some of these amœbæ experimented with were harmless amœbæ and not amœbæ dysenteriæ.

In our studies on dysentery in Manila we have been entirely convinced that we meet with at least two varieties of amœbæ in the stools of human beings. One of these varieties (amœba dysenteriæ) we have found in 68 of our 79 cases of amœbic dysentery, and in the neighborhood of 300 clinical cases of dysentery.

In another class of cases (cases without dysentery) in which we have purposely set out to find amœbæ after the administration of Rochelle salts we have found amœbæ in a small number of the cases (in about 4 per cent of those examined). The amœbæ found in these cases, with no dysentery and no history of it, are somewhat smaller generally than those found in our dysentery cases and have never been seen to contain red blood corpuscles. We are not willing to say that there are any other definite constant differences between these amœbæ and the amœba dysenteriæ except with regard to their action on cats.

One of these cases which has been under our observation for several months has had these harmless amœbæ in his stools constantly during this time, yet he has no dysentery and no history of any, and he has no intestinal trouble. We have repeatedly injected large numbers of these nondysenteric amœbæ (amœbæ coli), while motile in the stools, into the rectum of cats, but with no effect. We have neither been able to produce dysentery with them nor any lesions of the large bowel. Our experiments with straw amœbæ, which we have bred, has been similar; in not one of these cases has any dysentery or ulceration of the large intestine been produced.

On the other hand, we have had no difficulty in producing dysentery and ulceration of the large bowel in cats by injection of the stools or contents of liver abscesses containing motile amœbæ dysenteriæ. In 2 cases in which the liver abscesses have been found sterile by cultural experiment, but which contained many motile amœbæ, dysentery and characteristic ulceration of the bowel was produced in the two cats used. In the stools of these cats and in the ulcers in their colons we have found very large numbers of motile amœbæ, often containing red blood cells. The ulcers in the bowel are most striking in their resemblance to the amœbic lesions of the large intestine in man. The mucosa and submucosa have been particularly affected. We have been able to produce early amœbic ulcers in three days after inoculation; in five days the ulcerations may be well advanced. The complete description of this work will be referred to in a later paper. In a large number of experiments we have not been able to produce ulcerations or dysentery by the injection into the rectum of cats of bloody mucous stools from our acute specific dysenteric cases.

Why is it, then, that there still exists so much controversy about the amœba dysenteriæ? Kartulis, Councilman and Lafleur, Kovacs, Kruse and Pasouale, as well as ourselves, have all shown that it is an exquisite tissue parasite. We are convinced that anyone who has sufficient and proper material at hand can easily convince himself of the pathogenic action of this parasite, amœba dysenteriæ, by inoculation of cats if he cares to take this trouble.

When we review the literature of amœbic dysentery we frequently find a number of dysentery cases reported in which amœbæ are found only in a very small number. Let us suppose that the case which we have spoken of, and which we have had under observation for the past few months, whose stools contain the amœba coli, with no symptom of dysentery, became infected with bacillus dysenteriæ. Then, if a group of cases occurred with infection with this bacillus, it might be reported that amœbæ were found in only 1 case, and hence amœbæ in general have nothing to do with dysentery, etc. We cite this case because we believe that instances of this kind have occurred. In certain countries under certain conditions harmless amœbæ might be found quite frequently in the stools. So when we read that an observer reports 25 cases of dysentery with 5 cases in which amœbæ were present we wish to inquire, first, what lesions were present in the large bowel in these 5 cases; and second, were these amœbæ found capable of producing dysentery and dysenteric lesions in cats?

It is very clear from the literature that all observers have not worked with the same amœba. We must also remember that there may be many reasons for not finding amœbæ in dysentery: First, in certain forms of dysentery amœbæ do not occur. Second, one examination will not suffice, nor will sometimes several. Occasionally one may not find them at all in the stools during life, and yet at necropsy they may be very numerous in the lesions. We recall 1 case in which we looked carefully for four days in succession at the stools, but were never able to find amœbæ. Bacillus dysenteriæ was also carefully sought for, but not found; neither was there any agglutination of the blood serum for bacillus dysenteriæ. The man died, and at necropsy motile amœbæ dysenteriæ were found in large numbers in the characteristic lesions of the large bowel. We must remember that in infections with the anchylostoma no eggs may be passed for several days when extensive infection may exist. The same may be true often with other intestinal parasites. Again, the stools must be fresh and not mixed with quinine or disinfecting solutions or urine, which substances naturally quickly kill amœbæ. The stools must not be too cold. Lastly, it is to be remembered that after ulceration has been established, and particularly in the healing stage, the amœba may disappear from the stools. In this stage from the already existing ulcers, however, there may still be a dysentery for a variable time, no doubt effected by the bacteria present in the intestine. We will also recall that all cases of amœbic dysentery do not die, but that a number recover, and that we often find healing ulcers at necropsy. So if amœbæ are not found near the close of a dysentery we can not always conclude that they were not present in the active stage of the disease.

In closing our remarks on our amœbic cases for the present we wish to say a word in regard to dysenteric liver abscess. As Manson states (Tropical Diseases, 1898), there can be no question as to the existence of an intimate relationship between dysentery and liver abscess. Kartulis states that of some 500 liver abscesses which had come under his observation 55 to 60 per cent were of dysenteric origin, but he does not state the proportion of cases of dysentery in which abscess supervenes. (Lafleur, in Allbutt's System of Medicine, Vol. IV, 1897.) In 3,680 dysentery autopsies made in various tropical countries and collated by Woodward, 779 (21 per cent) revealed abscesses of the liver. Kruse and Pasquale found abscess six times in 57 cases of amœbic dysentery; Councilman and Lafleur six times in 15 cases. We have found liver abscesses fourteen times in 97 cases of amœbic dysentery. It has been shown over and over again that in a large proportion of liver abscesses the usual pyogenic cocci are absent. Bacteria were absent (by cultural experiment) in 7 of our 14 liver abscesses. In 2 small abscesses they were absent. It is very suggestive, as Manson has said, that in just this form of abscess in which these organisms are absent we find amœbæ dysenteriæ. Moreover, we are to remember that a liver abscess is not a proper abscess; amœbic liver abscess pus is not like pus elsewhere. As an abscess it is altogether peculiar. The argument that bacteria are not found in large liver abscesses, it is true, may be met with the statement that they might have been present and died out, as sometimes happens in old pyosalpinx cases. This view receives some support from the fact that in some instances the pyogenic bacteria and sometimes colon bacilli are present. But we must remember, on the other hand, that this form of liver abscess is not an ordinary form of abscess, as has been pointed out above; also, as far as we know, no one has pointed out that bacteria are any more frequent in small (early) liver abscesses, but, rather to the contrary, that they are more often absent. It is to be remembered that also in those cases of liver abscesses which are typical of the form of which we have been speaking, but in which amœbæ have not been demonstrated, that amœbæ are often very hard to find in these abscesses. Occasionally, as has often been reported, they may be looked for several days before they are found. This may often be explained by the fact that they are not present in so great numbers in the body of the abscess cavity, but are found in greater numbers in the abscess wall in connection with the breaking down tissues. We ourselves have, on several occasions, when perfectly fresh pus has been sent to us from an operation on liver abscess, been unable to find amœbæ in it in a very prolonged search. When in pus from the same cases later we have found them in great numbers. So, unless the examinations have been repeated and very thorough, the statement that these abscesses contain no amœbæ is of little value. We fear that the statistics are made up from many such hasty examinations. It might also perhaps be argued that if bacteria had disappeared in these abscesses so might the amœbæ disappear, though the argument may not have so much force when used in this way. In conclusion, we must remember that the bacteria may be only secondary invaders in liver abscesses and that we find amœbæ often present when bacteria are not; that we often find amœbæ present at the same time with bacteria, and that the number of these cases (where the search for amœbæ has been thorough) in which the amœba has not been found are comparatively small.

We have referred above, in describing the acute form of our dysentery, to the ingestion of the bacillus dyenteriæ in one individual. An Indian criminal under sentence of death, shortly before his execution, with his own consent and for a remuneration, took, about 7 p. m., 15 grains of sodium bicarbonate and fifteen minutes later a forty-eight hour bouillon culture of bacillus dysenteriæ in warm milk. He had had absolutely no dysentery, and his stools examined previously were well formed, dark, and contained no blood or mucus. On the next morning a well-formed normal stool was passed. During the evening of the next day his bowels moved again. The stool was moderately large and soft. Fine flakes and streaks of grayish mucus could be seen in it. Microscopical examinations of particles of this mucus showed a very large number of bacteria. In some fields almost nothing but bacteria could be seen. Many of these were not motile. Others, not so numerous, were very motile, and still others slightly motile and of similar morphology to bacillus dysenteriæ or to bacillus coli communis. There were a number of epithelial cells and a few red blood cells. The next stool was passed nearly four hours later. It consisted practically of large masses of bloody streaked mucus, and in amount equalled a large stool. Microscopical examination showed numerous epithelial cells, leucocytes, red blood corpuscles, and a large number of bacteria. Very few food particles were present. The stool was made up practically of masses of mucus, cells, and bacteria No amœbæ were present. During the night the patient had seven stools. They gradually became more blood streaked, and by the next day consisted of practically nothing but masses of reddish bloody mucus. During the day the patient had 12 stools, and the next night and morning 19 stools. The temperature had reached 102° F., and there was tenderness over the abdomen. We have no further notes on this case, but the patient recovered from his dysentery before execution. The onset here was not as abrupt as it often is in this form of dysentery. Natives are more or less immune to acute dysentery. The bacillus dysenteriæ was recovered from the stools and grew characteristically on all media after its recovery. More colonies of bacillus dysenteriæ developed on the agar plates than are often seen, yet the number of these colonies did not begin to equal the number of colon colonies which developed on the plates. We repeat again that we have never found the organisms in pure cultures in the stools. It has always been associated with bacillus coli communis and often with species of streptococci and sometimes staphylococci and other inconstant organisms. In fact, for a long time we were in doubt about the bacillus dysenteriæ, because we often found it in such small numbers in the stools and sometimes with great difficulty. Yet it is not more difficult to isolate from the fæces than bacillus typhosis when one looks at the right time. We have not referred to the virulent variety of bacillus coli described by Celli. It was not generally present in our acute cases. Occasionally the colon bacillus found in the stools of our cases showed no virulence toward animals; more rarely they were pathogenic for them. We, however, are inclined to think that certain varieties of colon bacilli may play an important part in certain forms of dysentery. The positive serum reactions which we have obtained at times for colon bacilli are suggestive. Nevertheless, we do not wish to lay too much stress on these reactions at present. Their interpretation now is in a somewhat uncertain light. We are about to undertake in the near future a more thorough study of these bacilli.

The experiments with bacillus dysenteriæ have shown us that when animals are immunized against large doses of this bacillus their blood shows certain antitoxic bodies, as evidenced by the fact that their blood serum in high dilutions causes agglutination of cultures of this organism, and by the fact that when their serum is injected at the same time with bouillon cultures of bacillus dysenteriæ into other animals no effect, or only a slight one, is produced by this organism. In this way we have been able, with monkey's blood serum, to render intraperitoneal injections of bacillus dysenteriæ into rats harmless. Reasoning in this way and from the blood serum reactions in our clinical cases in man, we have hoped that a serum therapy could be established for the disease, particularly as all other treatment is often of little avail. A cubic centimeter of the bouillon culture of bacillus dysenteriæ injected subcutaneously into a Manila pony causes a rise of temperature to 105° F. or more, with a gradual fall in a few days. During this time the animal may seem quite sick. If in the process of immunization an overdose is given the animal may become apparently quite ill and his temperature may rise to 108.5° F., as has happened on two occasions with our horse. The horse's blood now shows agglutination of bacillus dysenteriæ in high dilutions. We hope to be able to soon report on the treatment of the disease with this serum. We could never obtain monkey's serum of nearly so great an antitoxic strength as we have already procured from the horse.

Professor Flexner and Professor Barker, in their preliminary report upon an expedition sent by the Johns Hopkins University to investigate the prevalent diseases in the Philippines (Johns Hopkins Hospital Bulletin, February, 1900), state in regard to their bacteriological studies in dysentery: "The intestinal flora was studied in its entirety by means of plate cultures. Varieties of micro-organisms were separated. Many were well-known species. Tests with blood sera for agglutination were made. In this way two groups of bacilli were thus differentiated, (1) having affinities with the group of bacillus coli communis, (2) having affinities with the group of bacilli of which the bacillus typhosis is the type. A bacillus belonging to the second group which is still under study would seem to agree with the bacillus dysenteriæ isolated by Shiga from cases of endemic dysentery occurring in Japan. It is regarded by us as an important factor in the causation of the dysentery of the Philippine Islands." We have eagerly awaited Dr. Flexner's complete report on this subject, which we regret has not as yet reached us.

CONCLUSIONS.

Two distinct forms of dysentery exist in and about Manila, (1) an acute specific infectious dysentery, (2) an amœbic dysentery.[1]

The first is probably caused by the bacillus dysenteriæ, and the disease can not be produced experimentally in animals. The second is caused by the amœba dysenteriæ, and the disease can be produced experimentally in cats.

These two types of dysentery may be separated easily clinically. The one by a blood serum reaction, and the other by the presence of amœbæ dysenteriæ in the stools.

There are also at least two forms of amœbæ found in the human stools. The one form, amœba dysenteriæ, is capable of producing dysentery and dysenteric lesions in man and cats. The other, amœba coli, is apparently not harmful to either of these.

In conclusion, we wish to thank Dr. Simon Flexner, professor of pathology in the University of Pennsylvania, for several valuable suggestions to one of us during the first part of this work, and to Dr. W. R. Hall, major and surgeon, United States Army, commanding the First Reserve hospital, for the use of his valuable medical library. Also, we wish to thank Dr. G. I. Cullen, acting assistant surgeon, United States Army, for photographs.

RHEUMATIC AFFECTIONS.

Under the heading of rheumatic affections are tabulated the statistics of rheumatic fever, rheumatism, and myalgia and chronic rheumatic arthritis. In 1898 the rate of admission for the Army, regulars and volunteers, was 66.24, and in 1899 68.83 per thousand of strength. The rates in the Philippines, Cuba, Porto Rico, and the United States did not differ much from each other. The rate of discharge for disability on account of these rheumatic affections was 1.15 in 1898 and 1.52 in 1899, as compared with the average annual rate of 1.35 for the Regular Army during the decade 1888–1897.

PULMONARY CONSUMPTION.

In 1898 there were reported 547 cases of pulmonary tuberculosis; 165 were terminated by discharge for disability and 38 by death, equaling the respective rates of 3.70, 1.12, and 0.26 per thousand of strength. In 1899 the cases numbered 420, with 190 discharges and 57 deaths, equaling the respective rates of 3.98, 1.80, and 0.54 per thousand men. The Philippine Islands gave the highest rates in 1898: Admission, 5.95; discharge, 2.12; death, 0.50. In 1899 the admission rate for Porto Rico was 5.10, for Cuba 4.49, and for the Philippines 4.48; the highest death rates occurred in Porto Rico and the Philippines, 0.80 and 0.79 per thousand men.

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[1] We have not referred in this article to the mild form of catarrhal dysentery which occurs, but is rarely fatal here.—R. P. S.

It was speedily discovered by our medical officers in the Philippines that consumptive cases progressed unfavorably in that climate, even when cared for in the convalescent hospital on Corregidor Island in Manila Bay. It has therefore became the practice to transfer such cases to the United States for treatment in the general hospital for consumptives at Fort Bayard, N. Mex. Many consumptives from Manila have passed under the observation of Maj. A. C. Girard, surgeon, United States Army, in command of the general hospital, Presidio of San Francisco, Cal., who is of the opinion that—

> Tubercular cases should be transferred (from the Philippines) at the earliest possible stage, even before the bacillus can be demonstrated. An occasional error of diagnosis would be amply compensated by the possibility of recovery from consumption by an early transfer to Fort Bayard.

During the past two years the greater tendency of the colored troops to become affected with pulmonary consumption is shown by a comparison of the rates of admission. In 1898, white troops, 3.65; colored, 4.59 per thousand of strength. In 1899, white, 3.96; colored, 4.20.

DISEASES OF THE RESPIRATORY ORGANS.

These diseases, which in 1897 gave an admission rate of 77.74 and a death rate of 1.64, and during the decade 1887–1896 caused an average annual rate of 109.10 admissions and 0.83 death per thousand of strength, occasioned somewhat larger rates during the more active service of the years 1898 and 1899. In the former year the admission rate was 137.35, and in the latter 125.33. Troops in the United States had the largest rate in both years—152.13 in 1898 and 202.34 in 1899. The admission rate for these diseases in all the islands was less than the rate for the Army as a whole.

Pneumonia added but little to the admission rate of these diseases, but was the chief factor in the causation of mortality. In 1898 there were 1,020 cases with 136 deaths, and in 1899 629 cases with 99 deaths, giving a total of 1,649 cases with 235 deaths in the two years, the fatal cases constituting 14.25 per cent of the total, or 1 death in 7 cases. The rate of admission for the Army in 1898 was 6.90 per 1,000 of strength, and the death rate 0.92 per 1,000. In 1899 these rates were 5.96 and 0.94, respectively. Troops in the United States had the largest and those in Porto Rico the smallest admission and death rates from this disease.

The mean annual admission rate during the civil war was 32.45 and the death rate 7.79 per thousand men. Twenty-six per cent of the cases were fatal, the disease occasioning 1 death in 3.85 cases. As a contrast to this, the mean annual rates of the decade, 1888–1897, were: Admission, 4.06; death, 0.63.

ANKYLOSTOMIASIS.

While stationed at Ponce, P. R., Lieut. B. K. Ashford, assistant surgeon, United States Army, made a special study of the anæmia so common among the underfed natives of that island. In a number of cases he found the diseased condition to be due to the presence of the *Ankylostomum duodenale* in the intestine. His report, which is submitted below, was made the basis of a circular issued by the superior board of health of the island, inviting the attention of medical practitioners to the methods of recognizing and destroying the parasite.

I have the honor to report upon 20 cases of the severe anæmia commonly seen among the poor of this island. One of the first observations made by professional men here is the prevalence of anæmia, especially among the poor. This is at first attributed usually to starvation or poor food, then to malaria, and then to the "climate." Through the kindness of the physicians of Ponce, I am able to state something as to the mode of treatment adopted up to this time. Some have observed that the ignorant peon treated himself by purging, with beneficial effects for a time, and a relapse to previous conditions soon afterwards. Iron and arsenic have been prescribed largely, but with little benefit. Some physicians have frankly declared it beyond their power to cope with the disease, which they regarded as a pernicious progressive anæmia of obscure origin. The stools had been examined, but no worms being evident, this as a cause was dismissed. I was lead to examine the fæces for the ova of "ankylostomum duodenale," and found them in great numbers. Soon after a large dose of thymol brought away the parasites, male and female. No sooner had I stated my results to the physicians of this city than they agreed with the diagnosis, and verified the parasite and its eggs. Their testimony is as follows:

1. This disease is the most destructive and general disease of Porto Rico.
2. It is found typically and very frequently among the poor and badly fed.
3. Most cases are similar.
4. That bad food and bad hygiene are responsible for much of its power for evil.
5. That blood foods have never exercised more than a temporary influence on the course of this disease.
6. That improvement follows purgation.
7. That up to this time the existence of this parasite had not been proven on this island; or, if proven, not within their knowledge.

In studying this disease I have taken 20 cases which I considered typical of "Porto Rican anæmia," or "tropical chlorosis." These cases were selected from the provisional field hospital for indigent and sick Porto Ricans established after the flood of August 10, 1899, in this city. Although the histories of these cases are inclosed I should like to refer to such points as seem to me interesting and of frequent occurrence in this disease.

1. *The family history.*—Most patients give a history of deaths in the family from a like disease. At times this history is truly appalling, and casts a light on the extent of the infection among the people. Many claim the deaths to have been due to "malaria" or "diarrhea" or "obscure fever." Of course this matter is problematical, but it is fair to suppose, inasmuch as the disease is marked often by irregular fever, with intermissions, that their diagnoses may be questioned, and to recollect that our own physicians have in the past placed on malaria responsibilities which do not belong to it. But questions as to chills are extremely unsatisfactory. I know there is much malaria here in the lowlands; I have followed such cases through their course; but the testimony of local physicians coincides with mine, that malarial organisms in the blood are not so often seen as would be supposed. Chills, then, are not so frequent; there are few "ague cakes;" the pallor is not that of malaria, and the scleræ are not icteric. The most suggestive fact outside of blood examination is that the cases come from the mountains and the valleys; some of the very worst cases I have seen came from highly salubrious mountain districts. Nevertheless, I hesitate to affirm that many cases of malarial cachexias do not exist to swell the sum of anæmics here.

2. *The previous history of the patient.*—The diet is a powerful factor in turning the scale against the unhappy victim of ankylostomiasis. Rightly the physicians here quote its influence. Personally, I have eaten and slept in all parts of this island—not alone on the frequented roads, but in those rarely visited by strangers, and can submit my testimony to that quoted in support of this influence. The relation of the daily life among the working classes has been confirmed in talking with many owners of sugar and coffee plantations and their employees. They rise at from 4 to 6 a. m. Some take a little black coffee; some, boiled water and sugar; some, nothing. They work till 11, when they breakfast on about 4 ounces of codfish and a few pieces of plantain. They return to work at 1 and continue till 5 p. m. Dinner is composed of rice and beans; some have only boiled rice with lard, and some boiled rice alone. It may be mentioned that they get plenty of bad rum and some bad wine. This seems a slight enough diet, but the hurricane deprived them of even this, and the sick poor came drifting down on Ponce. I believe it not probable that those degraded to the level of people whose life is bounded by a tropical plantation, enjoying little beyond the cutting of cane and picking of coffee, can have a high standard of personal cleanliness, and, as a fact, bathing is not often practiced. Faeces are distributed over the earth wherever the individual happens to be while at work, or in a little shack when at home, but directly on the ground always. Indeed, faeces pollute their very houses. Ponce is a town of perhaps 40,000, yet it has no sewerage, and is in the lowlands near the sea. Closets and kitchens are in conjunction in many houses. The

water soon takes up its quota of whatever is noxious. Those who are clean in their habits (and the educated classes are a most cleanly people) are polluted by the filth of the poor and ignorant. The configuration of this island is one of steep mountains and deep ravines, with broad plains near the sea. Heavy rains wash the larvæ from each fæcal deposit into the water courses, and this muddy water is probably one source of contamination; contaminated earth on the hands of laborers is another; fouled garden is another. The larvæ have not yet been demonstrated in the water or mud. The drinking water of nearly all well-to-do people is filtered, and in this class we do not find so great a preponderance of this disease.

3. *The subjective symptoms.*—It is difficult to obtain a history of the disease from its inception, for many have it from infancy. Generally it is possible to obtain some such history as this: A variable appetite, some nausea and vomiting, pain in epigastrium, either constipation or diarrhea (or these may alternate), sometimes dysentery, swellings of the feet and ankles, no loss of weight, sleeplessness, restlessness, tinnitus aurium, giddiness, faintness, severe headache, palpitation of the heart, progressive debility; little perspiration, but kidneys active; fever sometimes, but no chills. I have not been able to get a history of geophagism nor of intestinal hemorrhage described by some authors. Sometimes the patients improve for a time after medication, but not permanently.

4. *Objective symptoms.*—Pallor: This is divided into three classes by a prominent physician, but I can not see that it has reference to more than the individual color of the patient, whatever that may be, irrespective of the disease. The conjunctivæ, lips, tongue, gums, nails, and cheeks are in some cases perfectly pallid, the mucous membranes especially being of a deathly white. The skin is generally a pasty yellow, a dirty brownish gray, or a grayish white. Expression: A passive expression is often seen, and its peculiar character is heightened by puffiness of the eyes and bloating of the face. Œdema: This is simply the usual accompaniment of severe anæmia. Practically every variety is seen, the chief being, in order of importance, œdema of the feet and ankles, œdema of the face, ascites and œdema of the scrotum. Hypostatic congestion of the lungs exists often. The important point is that with this disease there may be emaciation. This has not been present often in my cases; on the contrary, the patients are apparently well nourished. Anæmic ulcers are sometimes seen on the legs and an incorrect accusation of syphilis may be made. Corneal ulcers are at times seen. One of my cases presented corneal ulcers of both eyes. Respiratory symptoms: Generally none from this disease save in increased rapidity of breathing from anæmia, serous accumulations, or hypostatic congestions. Liver: No constant symptom. Spleen: No constant symptom. Heart: These symptoms are very aggravated; signs of a pernicious secondary anæmia. Pulsating vessels: Both jugulars, superficial veins of the arm, and vessels about the root of the neck and heart, in severe cases with greatly dilated heart; pulsating suprasternal and supraclavicular regions and diffused pulsations in the anterior thoracic wall. All kinds of deductions might be made by a careless observer. Hæmic murmurs are almost constantly present and are in many cases heard in the veins of the neck. The urine: No albumen is found, and the specific gravity is constantly low. The pulse is weak, rapid, soft, and compressible. The blood: Attention is invited to the accompanying summary of blood examinations. The following deductions are drawn:

1. A severe anæmia, falling as low as that of Addison's anæmia in count of red cells in some cases.
2. A very low hæmoglobin average, and a very low color index.
3. A marked eosinophilia in some cases. Forty per cent reached in one case. This follows the observation of Neusser.
4. No leucocytosis common to the disease itself. Leucocytosis recorded is always apparently due to complications, as noted.
5. Frequent presence of normoblasts and in some cases megaloblasts, but never a majority of megaloblasts.
6. Poikilocytosis common. Manson denies this.
7. Utter unreliability of blood foods without removal of the cause, the ankylostomum. This blood examination was the first line of research taken up, and as soon as anæmia was proven the patient was given blood tonics with temporary supporting treatment suited to the individual case, with the idea that the patient might be carried along until the true cause could be discovered. Of course now all treatment has been substituted by anthelmintics, chiefly male fern and thymol, and the blood and heart tonics will be again tried when the eggs have disappeared from the fæces. I was led to examine the stools carefully from the high eosinophile count, and it is certainly evident that trichinosis has a rival for high counts in ankylostomiasis.

The ankylostome was found in all cases save one, a case of tuberculosis pure and simple. This patient was chosen to represent a contrast, and I think he does.

There is true leucocytosis, and the eosinophiles are not much in evidence. Moreover, the red-cell count is much higher than all the others, as is the hæmoglobin record. In calling attention to this infection we enter upon a large field. The histories of this disease have been made up to show what percentage of the people have the disease in certain countries: 25 per cent in Egypt; 20 per cent in Maitland; 52 per cent in Madras; 13 per cent in Kyoto, Japan; but no percentage can be cited as yet for this island. Dr. B. Scheube, of Greiz, speaks in his work of its existing in the Antilles, but no island is specified, nor is the extent of the disease stated. From my own observation, and from the opinions of the resident physicians of the island, I believe it to be widespread and destructive. Only 20 cases have been examined, yet all save one have given me the ova of this parasite in large numbers. As the 20 cases were chosen at random from hundreds more just like them clinically, and as the one exception noted was chosen only for contrast, I am convinced that further investigation will show that the disease has killed its hundreds, and that it is curable and preventable. The proof of its prevalence lies naturally in the hands of all scientific physicians of this island. I can not further judge than from a short experience and the proof positive evidence of 19 cases submitted. If this infection is as great as it is possible and probable that it is, we may turn to the practical question of importance:

There is in Porto Rico a dense population in a small country. In a space of about 100 miles by 60 we have probably over a million people. Of the working class it can not be denied that a large percentage have anæmia, and should the future verify my suspicion means are at hand to increase not only the well-being of those now suffering, but to insure to the owner of large haciendas of coffee and sugar a better class of labor; to insure to the army protection from the invaliding from anæmia of such troops as are enlisted here; to insure to our American troops protection against the disease; to relieve the State and the hospitals here from the expense of caring for a large number of anæmics who are now slowly dragging on to a fatal end. Perhaps our own sick reports will unfold some additional facts. I mention here only such possibilities as have occurred to my mind, but it is a significant fact that though it is present in Germany Scheube notes that it is confined to a few cases. In other words, it appears to assume only such proportions as a country will allow it to assume. I repeat, I have no certain knowledge of the proportions it has assumed here. I have been able only to call attention to what I consider to be its extensive prevalence, and I can not quote any full experience from treatment. I have given thymol in several cases, with the always easily demonstrated presence of the parasite. From the exceeding kindness and the scientific spirit shown by the local doctors, I can not doubt that it will be but a short time before measures will be taken, if there is sufficient extent of the disease found, to alleviate the conditions.

I therefore respectfully submit this report, a photograph of my cases, their detailed histories, specimens of the eggs and parasites in 4 per cent formalin solution, and various preparations of stained and unstained blood.[1] I will not lengthen this paper by any description of a parasite so well known and so fully described by the professor of helminthology at the Army Medical School, nor will I make further remark on the history of the disease, its evident prophylaxis, and simple cure, until I can call to my aid a more extensive familiarity with it.

BERI-BERI.

Beri-beri prevailed extensively among Filipino prisoners of war at Cavite, where, in July, 1899, they were said to have been decimated by the disease, but no report concerning its prevalence there has been received. The first case reported as having occurred among our troops was in the person of a private of Company M, Fourteenth Infantry, a young man 22 years of age and a native of Akron, Ohio. His illness began suddenly, about July 21, 1899, while stationed at the arsenal at Imus. He was admitted to the hospital at Bacoor, August 6, where on August 17 Brigade Surg. George H. Penrose reported concerning him:

> Present illness began rather suddenly, about July 21, 1899, after an attack of acute diarrhea, with pains and weakness in muscles of thighs and legs, preventing him from walking. Character of pain, dull aching; has had paræsthesia, "falling asleep"

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[1] These were sent to the Army Medical Museum.

of legs. Has had occasional attacks of cardiac palpitations. These symptoms have become gradually more marked, and similar conditions are beginning in arms and forearms. Physical examination: Weight, 125 (former weight, 174) pounds; height, 70½ inches; apparently much emaciated; skin and mucous membranes pale; tongue pale, flabby, lightly coated; pupils react equally to light and distance; pulse of low tension, regular. Heart: Slight localized apex beat perceptible; first sound much ruffled, almost inaudible, second sound at base accentuated. Slight throbbing of carotids, pulsating jugulars. No murmurs audible. Area of cardiac dullness not increased. Muscular system of thighs and legs decidedly atrophied. Knee jerk practically abolished, muscles of thighs and calves tender on deep pressure. Sensation remains normal in legs. Gait weak and shuffling, not ataxic. Stands and walks with eyes closed. Electrical reactions not obtained. Steps have been taken to have the building wherein this soldier was quartered disinfected and whitewashed.

The only other information concerning this man found in the records is a note of his death October 4, 1899, in the Second Reserve hospital, at Manila: "Died at 8.15 a. m. of multiple peripheral neuritis, general, (beri-beri ?)."

A second case was reported by Acting Asst. Surg. J. M. Ward, from Carranglan, Luzon, August 1, 1900. The patient, a private of the Twenty-fourth Infantry, was admitted, with excessive pain in the head, back, and lower limbs, following a chill; temperature 38.6° C. Next morning the headache continued with stiffness and pain in the legs. The reflexes were abolished and the loss of power in the extensors of the right leg was so marked as to make locomotion impracticable; the right thigh measured 20 inches in circumference. Until June 25 his condition remained unchanged but for a decrease in pain and stiffness and a rapid atrophy of the right thigh. By June 30 an improvement was manifest. He was confined to bed, but his appetite returned and he slept well. During the next two weeks there was much improvement in his condition. The pain ceased and the patient became able to stand without a crutch, but the right thigh measured only 15.75 inches. Ten days later, July 25, he was able to walk to the company quarters, and on the 27th he was transferred to quarters. The treatment on admission was antimalarial with morphia hypodermatically; but this was speedily changed to potassium iodide, three times daily, with strychnia by hypodermatic injection, massage, and special diet.

VENEREAL DISEASES.

The admission rate for the Army, regulars and volunteers, in 1899 was 133, with 2.61 discharges for disability per thousand of strength. This admission rate is considerably larger than those of former years. The rate of the Army, regulars and volunteers, was 82.04 in 1898, with 1.05 discharges per thousand men. The regulars in 1897 had a rate of 84.59, and their mean annual rate for the decade 1887–1896 was 76.92.

The admission rate of the regulars in 1898 was 79.92, of the volunteers 83.01, per thousand men.

The following tabulations show prevalence by comparative rates of admission in 1899:

1899—REGULARS AND VOLUNTEERS.

	Army.	Cuba.	Porto Rico.	Philippines.	United States.
Syphilis and results	13.98	16.56	30.59	11.74	13.49
Gonorrhea and results	80.23	87.92	170.64	60.39	87.29
Chancroids and results	38.79	44.39	85.06	44.65	26.57
Total venereal	133.00	148.87	286.29	116.78	127.35

1899—REGULARS.

	Army.	Cuba.	Porto Rico.	Philippines.	United States.
Syphilis and results	14.77	15.87	28.38	13.26	13.85
Gonorrhea and results	93.18	106.53	174.48	66.92	99.66
Chancroids and results	38.29	48.88	92.32	40.18	24.92
Total venereal	146.24	171.28	295.18	120.36	138.43

1899—VOLUNTEERS.

	Army.	Cuba.	Porto Rico.	Philippines.	United States.
Syphilis and results	12.75	17.57	50.00	9.60	12.89
Gonorrhea and results	59.93	60.38	136.84	51.23	67.01
Chancroids and results	39.56	37.74	21.05	50.93	29.28
Total venereal	112.24	115.69	207.89	111.76	109.18

The greater prevalence of these infections among the colored troops is seen from the following rates of admission to sick report:

	White troops.		Colored troops.	
	1898.	1899.	1898.	1899.
Syphilis and results	9.39	13.39	28.24	22.43
Gonorrhea and results	51.18	78.16	67.29	109.82
Chancroids and results	17.91	37.04	54.05	63.67
Total venereal	78.48	128.59	149.58	195.92

Compared with the rates of previous years, this prevalence of venereal disease among our troops is excessive, and in Cuba and Porto Rico gave much anxiety to our medical officers. Our rates, however, high as they are, compare favorably with those of the British army at home and abroad. The admission rate at the home stations in 1898 was 132.7; at Dublin, 277.7, and at Portsmouth, 258.8. On foreign service the rates were higher than any of these—in the West Indies, 290.3; in the Straits Settlements, 348; among the large command in India, 371.4, and in China, 613.8. It is to be noted that the rate 371.4 in India is less by 136.4 per thousand than in 1897.

The increasing prevalence of venereal diseases among the troops in Matanzas and Santa Clara, Cuba, led Maj. F. J. Ives, surgeon, United States Volunteers, chief surgeon of the department, to institute measures for their repression. His system consisted in subjecting all enlisted men to a weekly examination, treating those who showed signs of disease and depriving them while under treatment of canteen privileges and passes from garrison. Thus all cases were submitted early to treatment, and were prevented from being aggravated by fresh exposures or by the use of stimulants. This system, which was at first opposed by army officers, is said to have given such excellent results that it now meets with nothing but commendation at the posts where it is in operation. Major Ives has not reported on this, and as he is now in China it is probable that he will not have an early opportunity of doing so.

The following circular was issued by the department commander:

CIRCULAR }
No. 4. }
HEADQUARTERS DEPARTMENT OF MATANZAS AND SANTA CLARA,
Matanzas, Cuba, March 13, 1900.

The following extracts from reports made by the chief surgeon of the department are approved and published for the information and guidance of the commands serving within the department:

* * * * * * *

"There should be a weekly examination of all the enlisted men in the command made by the medical officers, and the company commanders should be required to be in attendance. The men should be stripped and this examination should be complete as far as relates to any outward evidences of venereal disease or other infections. A list of all the men found infected with venereal troubles should be made out under the direction of the company commander and posted conspicuously on the bulletin board or in the barracks of each company organization. Among these thus affected only those who are actually incapacitated from performing their duties should be placed on sick report, the others being required to perform all duties. The privileges of the canteen and all pass privileges should be withdrawn from all whose names are thus posted and extra severe punishment meted out to those who are detected violating this rule. As soon as anyone thus listed is, in the opinion of the surgeon, free from all manifestations of venereal infection the surgeon should notify the company commander, so as to enable the latter to take his name from the list.

"This course can not be construed into actual punishment of the enlisted men, for the reason that in taking away his canteen and pass privileges it is merely in the nature of removing the causes which tend to retard his recovery.

"A weekly inspection is necessary, as there is no other way by which it can be determined whether or not the individuals are infected.

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"In connection with my letter of March 8, 1900, relating to the amelioration of venereal infection among the troops in this command, I have the honor to further recommend that at each post a medical officer be required to give a brief course of instruction to the noncommissioned officers on subjects pertaining to this matter. This course should include an outlined history of such venereal diseases as syphilis, gonorrhea, and chancroids, with their effects and results; the most practicable methods of prevention, such as avoidance of these women when the chance of contagion is most apt to occur, proper cleanliness and disinfection, etc.; also any other points which will give a practical and comprehensive idea as to their origin, course, and sequelæ, and the proper methods to avoid and prevent contagion.

"The intention of these instructions is to impart a common-sense knowledge among the most intelligent of the enlisted men, so that they will be in a position to influence and instruct the men in their companies."

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The stated inspection will be made every alternate Friday, except when the increase of contagious diseases is shown, when they will be made every Friday.

Post commanders will submit to these headquarters a report in detail, showing the result of each inspection.

By command of Brigadier-General Wilson:

S. H. Lincoln,
Lieutenant-Colonel Tenth Infantry, Acting Adjutant-General.

ALCOHOLISM.

The admission rate for alcoholism in the Army, regulars and volunteers, was 14.49 per thousand of strength in 1899 and 8.65 in 1898, as compared with 27.86 in the Regular Army in 1897 and 36.90, the mean annual rate of the preceding decade. From this it will be seen that there is more drunkenness in a command doing garrison duty in time of peace than among troops in active service. But, notwithstanding the small admission rates recorded above, alcoholism and its direct results were responsible for 29 deaths and 7 discharges for disability in 1899, and for 24 deaths and 9 discharges in 1898. During the past year the rate in Porto Rico and Cuba, where the troops were on garrison duty, was, respectively, 49.37 and 26.33, while in the Philippines, where active service was in progress, the rate was only 6.29. Newspaper articles have given prominence to the disastrous effects of "vino" and other alcoholic drinks among our troops in the Philippines, but their statements are by no means sustained by the official reports. In 1898, when for five months the troops were stationed in garrison in Manila, a rate of 21.70 was given by the small number of regulars present, but the rate of only 4.71, given by the larger number of volunteers in service there, reduced the rates for the Army, regulars and volunteers, in the Philippines to 9.69. As stated in my last report, these rates do not represent the amount of intemperance in the Army or in any of its parts, but as they are all derived from similar data, to wit, the number of cases in which medical assistance was invoked to avert danger to life, they are useful for purposes of comparison.

INSANITY.

Cases and rates of admission for the Army, regulars and volunteers, during the calendar years 1898 and 1899.

	1898.		1899.	
	Cases.	Rates.	Cases.	Rates.
In Cuba	6	0.72	32	1.60
In Porto Rico	5	.88	14	3.76
In the Pacific islands	12	1.21	84	2.14
In the United States	136	1.10	58	1.37
In the Army	159	1.08	188	1.78

In 1898 the rate of admission to sick report for the Army, regulars and volunteers, was 1.08 per thousand of strength, and in 1899, 1.78. The latter rate is higher than the mean annual rate of the decade 1888–1897, which was 1.17 per thousand, but it does not exceed the maximum rate of the decade, as may be seen from the following table, which shows that in 1892 the rate was 1.79 per thousand men:

Year.	Mean strength of command.	Total number of cases.	Ratio per thousand of strength.	Year.	Mean strength of command.	Total number of cases.	Ratio per thousand of strength.
1888	26,739	42	1.57	1896	27,183	22	0.81
1889	27,206	34	1.25	1897	27,374	21	.77
1890	26,684	33	1.24	Mean	27,117	31.7	1.17
1891	26,460	37	1.40				
1892	26,861	48	1.79	1898	147,795	159	1.08
1893	27,659	35	1.27	1899	105,546	188	1.78
1894	27,674	24	.87				
1895	27,326	21	.77				

The increase in the rate of admission in 1899 over the mean rate of the decade was due to a general rise in the rates, largest in Porto Rico (3.76 per thousand) and smallest in the United States (1.37 per thousand).

This increase was to have been expected, on account of the rapidity with which recruiting was effected during 1898 and 1899. It is well understood by army medical officers that among recruits there are always more mentally unsound men than among a similar number of civilians of the same age and physical development. The most careful physical examination often fails to detect a man whose brain works irregularly but who is sane enough to go to the recruiting office. Under the stimulus and excitement of the organization of troops many such men drift to the rendezvous, and must be eliminated after muster into service. Men excitable but not actually unbalanced lose their equilibrium under conditions of stress in the field, and the first two years of military life are apt to develop many such cases. Hence it was to be expected that the active recruiting of the past two years would bring into the ranks men who would increase the insanity admission rate of the Army. That this increase would be found chiefly among those sent on foreign service was also to be expected. No doubt many young men, separated from home and friends, became the subjects of intense mental depression, and their cases were properly recorded on the monthly reports of sick and wounded as cases of insanity, and as the only method affording a prospect of recovery was a return to their homes they were judiciously shipped by transport to the United States. Many such cases recovered during the trans-Pacific voyage or during their detention for observation at the general hospital, Presidio of San Francisco, Cal., and never reached the Government Hospital for the Insane, at Washington, D. C. That this is no mere supposition may be inferred from the following statement concerning the insanity cases of the Army as a whole and of the Philippine army:

In the Army, regulars and volunteers, during the calendar years 1898 and 1899 there were reported on the monthly reports of sick and wounded 347 cases of insanity, and 202 of these cases, or 58.2 per cent, were committed to the Government Hospital for the Insane. One hundred and thirty-five cases, or 66.7 per cent of the commitments, recovered in an average period of 3.9 months, 13 were improved, 6 died, and 48 remained unimproved. Ninety-six of the 347 cases were reported on the monthly reports of troops serving in the Pacific islands, and 32 of these, or 33.3 per cent, were sent to the Government Hospital for the Insane. Seventeen cases, or 53.1 per cent of those committed, recovered in an average period of 3.6 months, 2 were improved, 2 died, and 11 remained under treatment.

It is not deemed necessary to do more than present these official figures to silence the sensational newspaper paragraphs which have been published during the past year relative to the unusual number of cases of insanity which have been returned to the United States from our troops operating in the Philippine Islands.

SPECIAL MEDICAL REPORTS.

The following list comprises the reports on medical subjects rendered by medical officers during the fiscal year ended June 30, 1900:

Name.	Rank.	Report.
Alden, Wm	Acting assistant surgeon	Pernicious malaria.
Appel, D. M	Major and surgeon	Laryngeal tuberculosis. Pulmonary tuberculosis, 6 cases. Weekly statement of gain and losses in weight of patients in general hospital, Fort Bayard, N. Mex. Pulmonary tuberculosis, 5 thermographs. Tuberculosis.
Armstrong, S. T	Major and surgeon, volunteers.	Yellow fever at Puerto Principe, Cuba.
Ashford, B. K	First lieutenant and assistant surgeon.	Ankylostomiasis.
Baker, David	do	Typhoid fever.
Beal, H. W	Acting assistant surgeon	Yellow fever, transport McClellan.
Bradley, A. E	Captain and assistant surgeon.	Diphtheria on hospital ship Relief.
Cardwell, H. W	Major and surgeon, volunteers.	Acute dysentery.
Carr, L. C	do	Yellow fever, Santiago, Cuba, 1899.
Cattermole, C. A	Acting assistant surgeon	Prevention of disease among soldiers.
Chamberlain, W. P	First lieutenant and assistant surgeon.	Malta fever, 2 cases.
Church, J. R	do	Zoster facici.
Cogswell, Wm	Major and surgeon, volunteers.	Typhoid fever.
Cox, Walter	First lieutenant and assistant surgeon.	Malta fever.
Craig, Chas. F	Acting assistant surgeon	Report of bacteriological laboratory, U. S. general hospital, Presidio, San Francisco, Cal. Report on dysentery.

Name.	Rank.	Report.
Curry, J. J	Acting assistant surgeon	Malta fever. Blood examinations in typhoid fever.
Davis, John G	Major and surgeon, volunteers.	Chart, yellow fever and immigration.
Dougherty, J. C	Acting assistant surgeon	Yellow fever, 2 reports.
Drake, C. M	Major and surgeon, volunteers.	Variola.
Dudley, F. W	Acting assistant surgeon	Do.
Edger, B. J	First lieutenant and assistant surgeon.	Varioloid.
Fauntleroy, P. C	do	Report of Second Division field hospital, Eighth Army Corps, Angeles, P. I.
Flagg, C. E. B	Captain and assistant surgeon.	Variola. Tetanus. Pemphigus.
Forwood, W. H	Colonel and assistant surgeon-general	Inspection of general hospital, Presidio, San Francisco, Cal.
Fry, C. W	Acting assistant surgeon	Ptomaine poisoning on the transport City of Rio de Janeiro.
Gibson, E. T	do	Varioloid, 3 cases.
Girard, A. C	Major and surgeon	Report of autopsies performed at U. S. general hospital, Presidio, San Francisco, Cal., July 11 to Dec. 31, 1899, 41 cases. Autopsies made during January, 1900, 7 cases. Autopsies made during February, 1900, 11 cases. Autopsies made during April and May, 1900, 13 cases.
Godfrey, G. C. M	Captain and assistant surgeon.	Deaths, Pinar del Rio, Cuba, 1897 to 1900.
Gorgas, W. C	Major and surgeon	Map, yellow-fever cases, 1899. Yellow fever at Havana, Cuba, 1890 to 1900.
Grandy, L. B	Captain and assistant surgeon volunteers.	Variola.
Havard, V	Major and surgeon	Yellow fever at Santiago, Caba. Yellow fever, Division of Cuba. Inspection, posts in Cuba. Yellow fever, Quemados, Cuba.
Howard, D. C	Captain and assistant surgeon.	Cerebro-spinal meningitis. Insanity.
Hicks, J. R	Acting assistant surgeon	Gonorrheal pneumonia. Pelvic abscess. Æstivo-autumnal malarial fevers, 2 cases.
Hodson, F. A	do	Cardiac asthma.
Hughes, L. S	do	Typhoid fever.
Ireland, M. W	Captain and assistant surgeon.	Do.
Jackson, Thos. W	Acting assistant surgeon	Malarial fevers at Pinar del Rio, Cuba.
Kean, J. R	Captain and assistant surgeon.	Types of fever at Columbia Barracks, Quemados, Havana, Cuba.
Kieffer, C. F	do	Variola.
Kulp, John S	do	Report of supplementary hospital, Manila, with photographic illustrations. Bubonic plague.
Laine, D. T	Acting assistant surgeon	Yellow fever, thermographs, 2 cases.
Maclean, D., jr	do	Chronic alcoholism.
Mason, Chas. F	Captain and assistant surgeon.	Pemphigus contagious on transport Grant. Results from glycerinated vaccine lymph. Sanitary corps, insurrecto army.
McCaw, W. D	do	Scarlet fever. Variola.
Metcalf, B. H	Acting assistant surgeon	Alcoholism.
Miller, W. G	do	Variola at Angel Island, September and October, 1899.
Morris, E. R	Captain and assistant surgeon.	Diphtheria. Scarlet fever. Tuberculosis.
Moseley, E. B	Major and surgeon	Variola.
Munson, E. L	Captain and assistant surgeon.	Army ration in the Tropics.
Norman, Seaton	Captain and assistant surgeon volunteers.	Variola.
Nunez, E. F	Acting asisistant surgeon	Yellow fever.
Peed, Geo. P	do	Typhoid fever.
Penrose, G. H	Major and surgeon, volunteers.	Beri-beri.
Perley, H. O	Major and surgeon	Work done on hospital ship Relief, January to May 31, 1900.
Poindexter, J. D	Captain and assistant surgeon.	Disposal of excreta in camps.
Pope, B. F	Lieutenant-colonel and deputy surgeon-general.	Measles at Columbus Barracks, Ohio.
Quinton, W. W	Captain and assistant surgeon.	Yellow fever.
Rossiter, P. S	Acting assistant surgeon	Yellow fever.
Saleeby, Najeeb M	do	Epidemic of fever at Columbia Barracks, Havana, Cuba.
Shafer, J. J	do	Chronic myocarditis.
Shellenberger, J. E	Major and surgeon, volunteers.	Variola.
Shimer, Ira A	First lieutenant and assistant surgeon.	Insanity.
Smith, Bat	Acting assistant surgeon	Report on yellow fever. Salol in yellow fever.

Name.	Rank.	Report.
Stark, A. N.	Captain and assistant surgeon.	Yellow fever at Columbia Barracks, Havana, Cuba.
Strong, R. P.	First lieutenant and assistant surgeon.	Etiology of dysentery in the Philippines.
Taylor, B. D.	Major and surgeon	Bubonic plague, Honolulu, H. I.
Wells, G. M.	Captain and assistant surgeon.	Ptomaine poisoning, 57 cases, San Juan, P. R.
Williams, R. E.	Acting assistant surgeon	Variola.
Williamson, L.	First lieutenant and assistant surgeon.	Yellow fever, 2 reports.
Wilson, C.	Acting assistant surgeon	Typhoid fever at Aibonito, P. R.
Wilson, N. W.	do	Measles. Locomotor ataxia.
Woodhull, A. A.	Lieutenant-colonel and deputy surgeon-general.	Report of the medical department, Philippines, June 30, 1899.

INJURIES.

The number of injuries, with the discharges for disability and the deaths occasioned by them in the Army, regulars and volunteers, in the years 1898 and 1899 are here tabulated, together with the ratios per thousand of strength:

1898.

[Mean strength, 147,795.]

Injury.	Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Contusions and sprains	7,412	50.15	33	0.22	1	0.01
Dislocations	271	1.83	10	.07	1	.01
Fractures, not gunshot	790	5.35	28	.19	17	.12
Wounds, not gunshot	3,285	22.23	9	.06	13	.09
Wounds, gunshot	2,057	13.92	114	.77	302	2.04
Other injuries	6,932	46.90	232	1.57	112	.76
Total	20,747	140.38	426	2.88	446	3.03

1899.

[Mean strength, 105,546.]

Contusions and sprains	7,158	67.82	11	0.10	....	....
Dislocations	243	2.30	4	.04	....	....
Fractures, not gunshot	671	6.36	38	.36	14	0.13
Wounds, not gunshot	3,709	35.14	9	.09	23	.22
Wounds, gunshot	2,276	21.56	226	2.14	538	5.10
Other injuries	6,258	59.29	184	1.74	129	1.22
Total	20,315	192.47	472	4.47	704	6.67

The total number of injuries reported was nearly the same in both years, but the rate per thousand of strength is higher in 1899, because the mean strength of the Army was not so large in that year as in 1898. The rates of admission, 140.38 in 1898, and 192.48 in 1899, are smaller than the corresponding rate, 290.08, of the Regular Army in 1897, when the troops were on garrison duty at stations in the United States. That the injuries reported during a year of quiet garrison life are relatively more numerous than those recorded during a period when large commands were engaged in active and exhausting service is due to the care taken in times of peace to record the case of every man excused from any part of his military duty on account of sickness or injury. During active service trivial cases receive medical attention at sick call, but are seldom taken up on the register of sick.

The increase in the rates of discharge for disability from injury in 1898 and 1899, as compared with 2.02 per thousand of strength in 1897, is due to gunshot injuries, which of themselves occasioned a rate of 2.14 in 1899.

Correspondingly the death rate of 1.61 in 1897 became increased to 3.02 and to 6.67 during the two following years.

More than one-third of the injuries consisted of contusions and sprains, but although 44 men were discharged for resulting disability during the two years, only one case of death was reported.

Incised wounds in 1898 caused a total of 1,191 admissions to sick report, with 10 deaths, equivalent to an admission rate of 8.06 and a death rate of 0.07 per thousand of strength, and in 1899 a total of 1,315 admissions, with 21 deaths, equivalent to an admission rate of 12.46 and a death rate of 0.20, as compared with 16.34 and 0.03, the respective average annual rates of the decade of peace 1888–1897. It is to be noted that 4 of these fatal wounds in 1899 were suicidal and 4 homicidal.

Included among these incised wounds are 21 cases reported as bolo wounds. Eight of these were almost immediately fatal, 9 were returned to duty, 2 discharged on certificates of disability, and 2 mustered out with their regiments.

Drowning.—Thirty-five deaths from drowning were reported in 1898, 13 from the Volunteer and 22 from the Regular Army. Ninety-nine deaths were reported in 1899, 19 volunteers and 80 regulars; 78 of the drownings occurred in the Philippines.

Exhaustion from fatigues and exposures occasioned 1,410 admissions to sick report in 1898 and 1,476 in 1899, equivalent to the respective rates of 9.54 and 13.98 per thousand of strength. Eleven deaths and 9 discharges were reported during the former year; 3 deaths, but no discharge, during the latter. The volunteers suffered from this cause considerably more than the regulars. Their admission rate in 1898 was 10.89, as compared with 6.61 among the regular troops, and in 1899, 17.37, as compared with 11.82. Most of these cases occurred in the Philippine Islands, where the rate per thousand of volunteer troops serving in those islands was 40.10.

Heat stroke occasioned 544 admissions in 1898, equal to 3.68 cases per thousand men, with 9 deaths and 12 discharges for disability, and in 1899, 204 admissions, equal to 1.93 cases per thousand, with 2 discharges but no death. The regulars were the heavier sufferers from this cause, their admission rate having been 5.34 in 1898, with 8 deaths and 3 discharges, as against a rate of 2.92 in the volunteers, with 1 death and 9 discharges, and 2.20 in 1899, as against the volunteer rate of 1.51, with 1 discharge and no death in each instance.

Hernia.—In the Army, regulars and volunteers, in 1898, 1,050 cases of rupture were reported, with 171 discharges and 2 deaths. The admission rate for the volunteers was 7.86 per thousand men and for the regulars only 5. This implies a higher grade of physique on the part of the latter. In 1899, however, the rate for the regulars, 7.57 per thousand, was nearly as high as that for the volunteers, 7.71, a result probably of hasty recruiting.

The following cases, additional to those published in previous annual reports from this office, have been operated on for the radical cure of hernia. This list includes the cases of 53 regular soldiers, 17 volunteer soldiers, 4 in which the organization is not stated, and 5 civilians. Besides these cases reported specially, 19 cases are mentioned as having been operated on at the First Reserve Hospital, Manila. (See p. 327.)

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
G. S.	Pvt., Ordnance		Right inguinal	Jan. 28, 1899	Maj. Wm. H. Arthur, surgeon, U. S. A.
J. M.	Corpl., D, 7th Cav		do	Mar. 5, 1899	
J. O.	Pvt., C, 2d Arty		Left inguinal	Mar. 29, 1899	
G. F. T.	Pvt., D, 2d Arty		do	do	
H. A.	Pvt., G, 15th Infty		Ventral	May 7, 1899	
G. A. F.	Pvt., Ordnance	28	Left inguinal	July 6, 1899	Maj. J. M. Banister, surgeon, U. S. A.
W. A. M.	Cadet, U. S. M. A		Right inguinal	Aug. 22, 1899	
D. H. B.	do		do	Aug. 28, 1899	
R. P.	Pvt., band, U. S. M. A		Left inguinal	Oct. 20, 1899	
R. R.	Pvt., army service		Left femoral	Mar. 31, 1900	
R. R.	do		Right femoral	May 10, 1900	
S. B. H.	Cadet, U. S. M. A		Right inguinal	May 15, 1900	
C. F. C.	do		do	May 13, 1900	
E. R. W.	Cadet, U. S. M. A		do	July 6, 1900	
C. A. P. H.	Major, 8th Cav	48	do	June 29, 1899	Capt. W. C. Borden, assistant surgeon, U. S. A.
A. E. C.	Pvt., C, 3d Arty	31	Ventral	Sept. 12, 1899	
C. M.	Saddler, M, 7th Arty	35	Left inguinal	Sept. 15, 1899	
W. H.	2d class pvt., Ordnance	46	do	Sept. 19, 1899	
A. A. C.	Civilian	31	Double inguinal	Oct. 10, 1899	
E. H.	Sergt., F, 7th Arty	37	Right inguinal	Nov. 3, 1899	
O. F.	Sergt., A, 5th Arty	39	do	Nov. 10, 1899	
J. W.	Pvt., Hospl. Corps	24	do	Nov. 24, 1899	
A. D. M.	Pvt., C, 19th Infty	27	Ventral	Jan. 12, 1900	
H. G. L.	1st lieut., 24th Infty	34	Left inguinal	Feb. 2, 1900	
W. H. J.	Civilian	25	Right inguinal	Feb. 9, 1900	
M. J.	Pvt., H, 2d Arty	27	do	Mar. 13, 1900	
O. O. M.	2d class pvt., Engineers	24	Double inguinal	May 30, 1900	
P. F.	Pvt., C, 4th Arty	24	Left inguinal	June 8, 1900	
R. R.	Pvt., G, 2d Infty	22	Right inguinal	June 12, 1900	
P. M. K.	Civilian	52	Double inguinal	June 19, 1900	
M. S. H.	do	38	Right inguinal	June 20, 1900	
C. J.	Pvt., D, 24th Infty		do	Apr. 1, 1900	Capt. A. E. Bradley, assistant surgeon, U. S. A.
C. N.	Band, U. S. M. A		Left inguinal	Feb. 2, 1899	First Lieut. D. F. Duval, assistant surgeon, U. S. A.
C. S.	Pvt., M, 24th Infty	21	Inguinal	Dec. 2, 1899	Maj. R. G. Ebert, surgeon, U. S. A.
J. E. K.	Sergt., F, 13th Minn. Vols		Right inguinal	Apr. 14, 1899	Maj. R. J. Fitzgerald, surgeon, U. S. V.
R. A. D.	Pvt., A, 13th Minn. Vols		do	June 6, 1899	
L.			do	Jan. 31, 1900	Capt. C. E. B. Flagg, assistant surgeon, U. S. A.
			do	Feb. 1, 1900	
			do	Jan. 24, 1900	
G. M.	Pvt., 25th Infty		do	Aug. 15, 1899	Col. Wm. H. Forwood, assistant surgeon-general, U. S. A.
F. N. F.	Rect., unassigned		do	July 9, 1899	Maj. A. C. Girard, surgeon, U. S. A.
M. S.			do	Aug. 15, 1899	
E. H.	P. Co., 10, Cas. Detch		do	do	
W. H.	Q, Sergt., 1st N. D. V. I		do	do	
S. J. L.	Pvt., 1st Colo. V. I		Left inguinal	Aug. 16, 1899	
S. V.	Pvt., K, 1st Colo. V. I		Double inguinal	Aug. 30, 1899	
L. W. K.	Pvt., I, 20th Kans. V. I		Right inguinal	Sept. 3, 1899	
L. W. W.	Pvt., M, 1st Cal. V. I		Left inguinal	do	
C. W. N.	Sergt., G, 1st N. D. V. I		Right inguinal	Sept. 7, 1899	
A. H. H.	Corpl., B, 1st N. D. V. I		Left inguinal	do	
C. C.	Sergt., 9th Cav		do	Sept. 9, 1899	
N. P. S.	Pvt., D, 1st Cal. H. A		do	do	
C. K.	Wag., D, 1st S. D. V. I		Right inguinal	Sept. 16, 1899	
L. O.	Pvt., A, 1st Idaho V. I		Left inguinal	do	
W. McL.	2d lieut., 1st N. D. V. I		do	Sept. 19, 1899	
L. P. A.	Pvt., A, 1st Cal. H. A		Right inguinal	Oct. 11, 1899	
T. McC.	Pvt., A, 1st Idaho V. I		do	do	
F. J. M.	Pvt., G, 45th Infty		Left inguinal	Nov. 2, 1899	
O. L. B.	Pvt., B, 22d Infty		do	Dec. 4, 1899	
H. H. S.	Discharged soldier		do	Feb. 10, 1900	
E. B. B.	Capt., I, 16th Infty		Right inguinal	Feb. 12, 1900	
E. H. J.	Discharged soldier		do	Feb. 27, 1900	
D. F. A.	Capt., 12th Infty		Left inguinal	Apr. 14, 1900	
L. B.	Pvt., N, 6th Arty		do	do	
A. J. C.	Pvt., Hospl. Corps		Right inguinal	Apr. 24, 1900	
H. W. B.	Pvt., O, 3d Arty		do	Apr. 28, 1900	
R. B.	Pvt., B, 16th Infty		do	May 26, 1900	
W. E. B.	Act. hospl. steward		Left inguinal	do	
P. K.	Pvt., Ordnance		Double inguinal	June 11, 1900	

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
L. E. C.	Pvt., 29th Kans. V. I	......	Right inguinal	Aug. 15, 1899	Capt. Henry A. Shaw, assistant surgeon, U. S. A.
E. B.	Pvt., M, 10th Cav	......	Left inguinal	Jan. 18, 1900	First Lieut. Ira A. Shimer, assistant surgeon, U. S. A.
T. M.	do	......	do	do	
T. McG.	General prisoner	......	Right inguinal	Jan. 23, 1900	
F. H.	Pvt., D, 8th Infty	49	Left inguinal	Feb. 25, 1900	Capt. A. N. Stark, assistant surgeon, U. S. A.
P. C.	Pvt., H, 7th Cav	26	Double inguinal	Mar. 31, 1900	
J. E. McG.	Mus., F, 2d Arty	48	Left inguinal	Apr. 18, 1900	
G. G. S.	Act. hospl. steward	......	Right inguinal	May 27, 1900	
J. E. F.	Civilian	......	Left inguinal	June 3, 1900	Capt. Charles Willcox, assistant surgeon, U. S. A.
R. B.	Corpl., B, 1st Arty	......	do	Jan. 12, 1900	

GUNSHOT INJURIES.

Regular Army, 1898.—During the calendar year 1898 there were reported from the Regular Army 1,457 gunshot injuries, 1,320 of which were battle casualties and 137 the result of accidents, quarrels, attempted suicide, etc.

Of the battle wounds, 1,221 were said to have been caused by bullets, 83 by shell, and 16 by shrapnel. In 57 cases the site and extent of the wounds were not stated. Flesh wounds in various parts of the body numbered 860, constituting 68.1 per cent of the total number in which the site of the wound was stated; 85 were penetrating wounds of the thorax or abdomen; 41 fractures of the cranial or facial bones, and 7 of the spine; 140 fractures of the upper extremity, in 86 of which only the metacarpus or fingers were involved; 130 fractures of the lower extremity, the shaft of the femur being involved in 26, the kneejoint in 17, the leg and ankle in 34, and the metatarsus and toes in 53.

The site and character of these wounds and the manner in which the completed cases were terminated are stated in my last annual report, pages 308–314.

Volunteer Army, 1898.—In the volunteer force during the calendar year 1898, 689 gunshot injuries were reported. Eighty-nine of these were immediately fatal and were not taken up on the reports of sick and wounded.

Of the 600 cases taken on sick report, 29, or 4.8 per cent, ended fatally; 4 ended in death, but from other causes than the gunshot injury; 437 were returned to duty; 18 were discharged on certificates of disability in 1898, and 8 others in 1899; 7 were discharged by order, and the injured men in 97 cases were mustered out with their regiments.

Of the 600 cases, 362 were battle wounds, 250 of which ended in return to duty, 12 in death as the result of the wounds, and 4 in death from other causes. Six of the wounded men were discharged on certificates of disability in 1898 and 3 others in 1899. Three were discharged by order and 84 were mustered out with their regiments.

Of the 600 cases 238 were not battle wounds, but 208 of them were reported as having been incurred in the line of duty.

Flesh wounds in various parts of the body numbered 412, or 68.7 per cent of the whole number of cases.

Of 8 fractures of the bones of the cranium 4 terminated fatally. Of 6 fractures of the bones of the face 1 proved fatal from secondary hemorrhage after ligation of the lingual artery. Of 13 wounds of the neck 3 were fatal. Of 2 fractures of the spine both patients died, the only operative proceedings recorded being the removal of spiculæ of bone in one of the cases.

Thirty-two penetrating wounds of the thorax were reported, of which 6 were fatal. A rib was resected in 1 case for empyema, with a favorable result.

Of 12 penetrations of the abdomen 2 ended favorably without surgical intervention and 10 were fatal. Among the latter was 1 in which the abdomen was opened and 1 in which a portion of the injured intestine was resected.

In 9 cases of fractured humerus, none fatal, the operative work consisted of amputation in 2 cases, removal of fragments of bone in 1 case, and an incision for drainage in 1 case. In 12 fractures of the forearm amputation was performed in 2 cases, fragments of bone removed in 1 case, and the bullet was removed in 2 cases, in 1 of which the X ray was used for the discovery of the missile. In 25 cases of fractured fingers amputation was performed in 11 cases.

Nine fractures of the femur, none fatal, were reported. Amputation and reamputation were performed in 1 case, and the missile or fragments of bone were extracted in 3 cases. The kneejoint was injured in 9 cases, in 1 of which the joint was opened and drained. The leg was fractured in 7 cases, in 1 of which amputation was performed. The tarsus and metatarsus were fractured in 5 cases, necessitating amputation in one instance, and the toes were fractured in 3 cases, all of which required amputation.

In a flesh wound of the lumbar region the bullet was discovered by the X ray, but was not removed.

The following tabulations give the details of these gunshot injuries:

Killed by gunshot.

VOLUNTEER ARMY, 1898.

Character and location of wounds.	How received.						Nature of missile.					
		Not in action.					In action.			Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Bullets not stated.	Shell.	Bullet.	Revolver.	Shrapnel.
Head fracture	12	3	......	1	2	18	3	9	....	4	1	1
Face fracture	1	......	......	....	....	1	1	......	....	......	......	......
Neck	......	1	......	....	....	1	......	......	....	1	......	......
Thorax, penetrating	9	1	......	4	6	20	1	8	....	11	......	......
Abdomen, penetrating	7	1	......	1	1	10	3	2	2	3	......	......
Thigh fracture, upper third	1	......	......	....	....	1	......	1	....	......	......	......
Unknown	25	8	......	2	3	38	8	17	....	13	......	......
Total	55	14	......	8	12	89	16	37	2	32	1	1

Gunshot wounds which terminated fatally.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.						Nature of missile.			
		Not in action.					In action.		Not in action.	
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Bullets not stated.	Bullet.	Revolver.
Head fracture	4	......	......	......	......	4	3	1	......	......
Face fracture	1	......	......	......	......	1	......	1	......	......
Neck	1	2	......	......	......	3	1	......	1	1
Spine fracture	2	......	......	......	......	2	1	1	......	......
Thorax, penetrating	2	2	1	1	......	6	1	1	4	......
Abdomen, penetrating	2	7	......	......	1	10	1	1	5	3
Thigh, flesh	......	1	......	......	......	1	......	......	1	......
Kneejoint	......	......	1	......	......	1	......	......	1	......
Leg, flesh	......	......	1	......	......	1	......	......	1	......
Total	12	12	3	1	1	29	7	5	13	4

Gunshot wounds received in action.

VOLUNTEER ARMY, 1898.

Character and location of wound.	Nature of missile.							Disposition.						
	Mauser.	Remington.	Bullets, other.	Shell.	Shrapnel.	Piece of steel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Deaths, other causes.	Total.
Head:														
Flesh	13	....	12	2	2	....	29	26	....	....	....	2	1	29
Fracture	6	....	1	....	....	....	7	......	....	4	....	2	1	7
Face:														
Flesh	4	....	....	2	1	....	7	6	....	....	....	1	....	7
Fracture	......	....	5	....	....	....	5	3	....	1	1	....	....	5
Neck	5	....	4	....	....	....	9	6	....	1	....	2	....	9
Spine, fracture	1	....	1	....	....	....	2	......	....	2	....	....	....	2
Thorax:														
Nonpenetrating	9	....	3	1	1	....	14	10	....	....	....	3	1	14
Penetrating	14	....	8	....	....	....	22	9	1	2	....	10	....	22
Abdomen:														
Nonpenetrating	2	....	....	1	....	....	3	3	....	....	....	....	....	3
Penetrating	2	....	2	....	....	....	4	2	....	2	....	....	....	4
Back and hip, flesh	6	....	7	....	....	....	13	9	....	....	....	4	....	13
Perineum, genital and urinary organs	2	....	1	....	....	....	3	2	....	....	1	....	....	3
Shoulder:														
Flesh	18	....	12	2	1	....	33	26	1	....	....	5	1	33
Fracture, clavicle or scapula	......	....	2	....	....	....	2	1	....	....	....	1	....	2
Arm:														
Flesh	12	....	17	1	1	....	31	23	1	....	1	6	....	31
Fracture	3	....	....	....	1	1	5	2	....	....	....	3	....	5
Elbow joint	......	....	1	....	....	....	1	1	....	....	....	....	....	1
Forearm:														
Flesh	7	....	9	....	2	....	18	16	....	....	....	2	....	18
Fracture	4	....	3	1	....	....	8	2	....	....	....	6	....	8
Hand, flesh	10	....	13	....	1	....	24	20	2	....	....	2	....	24
Carpus and metacarpus, fracture	1	....	1	....	....	....	2	1	....	....	....	1	....	2
Fingers, fracture	3	....	6	....	....	....	9	3	....	....	....	6	....	9
Thigh:														
Flesh	19	2	21	1	2	....	45	37	....	....	....	8	....	45
Fracture, upper third	2	....	1	....	....	....	3	1	1	....	....	1	....	3
Fracture, middle third	3	....	1	....	....	....	4	2	....	....	....	2	....	4
Fracture, lower third	......	....	....	1	....	....	1	......	1	....	....	....	....	1
Kneejoint	1	....	3	....	1	....	5	4	....	....	....	1	....	5
Leg:														
Flesh	9	....	12	2	1	....	24	16	....	....	....	8	....	24
Fracture	5	....	....	....	....	....	5	1	1	....	....	3	....	5
Foot, flesh	6	1	7	....	....	....	14	12	1	....	....	1	....	14
Tarsus and metatarsus, fracture	1	....	1	1	....	....	3	2	....	....	....	1	....	3
Unknown	......	....	7	....	....	....	7	4	....	....	....	3	....	7
Total	168	3	161	15	14	1	362	250	9	12	3	84	4	362

Gunshot wounds other than battle wounds.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.					Nature of missile.							Disposition.					
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Total.
Head:																		
Flesh	3	2	......	......	5	......	5	......	......	......	......	5	5	......	......	......	......	5
Fracture	......	1	......	......	1	......	......	1	......	......	......	1	1	......	......	......	......	1
Face:																		
Flesh	4	......	......	......	4	......	4	......	......	......	......	4	4	......	......	......	......	4
Fracture	1	......	......	......	1	......	1	......	......	......	......	1	......	1	......	......	......	1
Neck	3	1	......	......	4	......	2	2	......	......	......	4	2	......	2	......	......	4
Thorax:																		
Nonpenetrating	9	2	......	......	11	......	11	......	......	......	......	11	10	......	......	......	1	11
Penetrating	8	1	1	......	10	......	10	......	......	......	......	10	2	2	4	......	2	10
Abdomen:																		
Nonpenetrating	1	1	......	......	2	......	2	......	......	......	......	2	2	......	......	......	......	2
Penetrating	7	......	......	1	8	......	5	3	......	......	......	8	......	......	8	......	......	8
Back and hip, flesh	8	1	......	......	9	......	8	1	......	......	......	9	9	......	......	......	......	9
Perineum, genital and urinary organs	3	......	......	......	3	......	2	1	......	......	......	3	2	......	......	......	1	3
Shoulder:																		
Flesh	7	......	......	......	7	......	6	1	......	......	......	7	6	......	......	......	1	7
Arm:																		
Flesh	5	2	......	......	7	......	6	......	1	......	......	7	7	......	......	......	......	7
Fracture	4	......	......	......	4	......	3	1	......	......	......	4	3	1	......	......	......	4
Elbow joint	1	......	......	......	1	......	1	......	......	......	......	1	1	......	......	......	......	1
Forearm:																		
Flesh	10	2	......	......	12	......	11	1	......	......	......	12	11	......	......	......	1	12
Fracture	4	......	......	......	4	......	4	......	......	......	......	4	1	2	......	......	1	4
Wrist joint	......	1	......	......	1	......	1	......	......	......	......	1	1	......	......	......	......	1
Hand, flesh	30	2	......	......	32	1	19	10	1	1	......	32	29	1	......	1	1	32
Carpus and metacarpus, fracture	1	......	......	......	1	......	1	......	......	......	......	1	1	......	......	......	......	1
Fingers, fracture	15	1	......	......	16	......	12	2	......	1	1	16	11	5	......	......	......	16

Thigh.																		
Flesh	21	3	......	......	24	......	16	8	......	......	......	24	22	......	1	1	......	24
Fracture middle third	1	......	......	......	1	......	1	......	......	......	......	1	......	1	......	......	......	1
Kneejoint	2	2	......	......	4	......	3	1	......	......	......	4	2	1	1	......	......	4
Leg:																		
Flesh	32	2	......	......	34	......	32	1	......	1	......	34	30	1	1	......	2	34
Fracture	1	1	......	......	2	......	1	1	......	......	......	2	......	1	......	1	......	2
Foot, flesh	18	3	......	......	21	......	17	4	......	......	......	21	17	1	......	1	2	21
Tarsus and metatarsus, fracture	2	......	......	......	2	......	......	2	......	......	......	2	2	......	......	......	......	2
Toes, fracture	3	......	......	......	3	......	3	......	......	......	......	3	3	......	......	......	......	3
Unknown	4	......	......	......	4	......	4	......	......	......	......	4	3	......	......	......	1	4
Total	208	28	1	1	238	1	191	40	2	3	1	238	187	17	17	4	13	238

All gunshot wounds.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.						Nature of missile.										Disposition.						
		Not in action.																					
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Shrapnel.	Piece of steel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Deaths, other causes.	Total.
Head:																							
Flesh	29	3	2	....	....	34	13	....	....	17	....	....	2	2	....	34	31	....	....	....	2	1	34
Fracture	7	....	1	....	....	8	6	....	....	1	1	....	....	....	....	8	1	....	4	....	2	1	8
Face:																							
Flesh	7	4	....	....	....	11	4	....	....	4	....	....	2	1	....	11	10	....	....	....	1	....	11
Fracture	5	1	....	....	....	6	....	....	....	6	....	....	....	....	....	6	3	1	1	1	....	....	6
Neck	9	3	1	....	....	13	5	....	....	6	2	....	....	....	....	13	8	....	3	....	2	....	13
Spine, fracture	2	....	....	....	....	2	1	....	....	1	....	....	....	....	....	2	....	....	2	....	....	....	2
Thorax:																							
Nonpenetrating	14	9	2	....	....	25	9	....	....	14	....	....	1	1	....	25	20	....	....	....	4	1	25
Penetrating	22	8	1	1	....	32	14	....	....	18	....	....	....	....	....	32	11	3	6	....	12	....	32
Abdomen:																							
Nonpenetrating	3	1	1	....	....	5	2	....	....	2	....	....	1	....	....	5	5	....	....	....	....	....	5
Penetrating	4	7	....	....	1	12	2	....	....	7	3	....	....	....	....	12	2	....	10	....	....	....	12
Back and hip, flesh	13	8	1	....	....	22	6	....	....	15	1	....	....	....	....	22	18	....	....	....	4	....	22
Perineum, genital and urinary organs	3	3	....	....	....	6	2	....	....	3	1	....	....	....	....	6	4	....	....	1	1	....	6
Shoulder:																							
Flesh	33	7	....	....	....	40	18	....	....	18	1	....	2	1	....	40	32	1	....	....	6	1	40
Fracture clavicle or scapula	2	....	....	....	....	2	....	....	....	2	....	....	....	....	....	2	1	....	....	....	1	....	2
Arm:																							
Flesh	31	5	2	....	....	38	12	....	....	23	....	1	1	1	....	38	30	1	....	1	6	....	38
Fracture	5	4	....	....	....	9	3	....	....	3	1	....	....	1	1	9	5	1	....	....	3	....	9
Elbow joint	1	1	....	....	....	2	....	....	....	2	....	....	....	....	....	2	2	....	....	....	....	....	2
Forearm:																							
Flesh	18	10	2	....	....	30	7	....	....	20	1	....	....	2	....	30	27	....	....	....	3	....	30
Fracture	8	4	....	....	....	12	4	....	....	7	....	....	1	....	....	12	3	2	....	....	7	....	12
Wrist joint	....	....	1	....	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....	1
Hand, flesh	24	30	2	....	....	56	10	....	1	32	10	1	1	1	....	56	49	3	....	1	3	....	56
Carpus and metacarpus, fracture	2	1	....	....	....	3	1	....	....	2	....	....	....	....	....	3	2	....	....	....	1	....	3
Fingers, fracture	9	15	1	....	....	25	3	....	....	18	2	....	1	1	....	25	14	5	....	....	6	....	25

Thigh:																							
Flesh	15	21	3	....	....	69	19	2	....	37	8	....	1	2	....	69	59	......	[1] 1	1	5	....	69
Fracture upper third	3	......	....	....	....	3	2	....	....	1	....	....	....	....	....	3	1	1	....	....	1	....	3
Fracture middle third	4	1	....	....	....	5	3	....	....	2	....	....	....	....	....	5	2	1	....	....	2	....	5
Fracture lower third	1	......	....	....	....	1	......	....	....	......	....	....	1	....	....	1	......	1	....	....	......	....	1
Kneejoint	5	2	2	....	....	9	1	....	....	6	1	....	....	1	....	9	6	1	[2] 1	....	1	....	9
Leg:																							
Flesh	24	32	2	....	....	58	9	....	....	44	1	....	3	1	....	58	46	1	[3] 1	....	10	....	58
Fracture	5	1	1	....	....	7	5	....	....	1	1	....	....	....	....	7	1	2	....	1	3	....	7
Foot, flesh	14	18	3	....	....	35	6	1	....	24	4	....	....	....	....	35	29	2	....	1	3	....	35
Tarsus and metatarsus, fracture	3	2	....	....	....	5	1	....	....	1	2	....	1	....	....	5	4	......	....	....	1	....	5
Toes, fracture	......	3	....	....	....	3	......	....	....	3	....	....	....	....	....	3	3	......	....	....	......	....	3
Unknown	7	4	....	....	....	11	......	....	....	11	....	....	....	....	....	11	7	......	....	....	4	....	11
Total	362	208	28	1	1	600	168	3	1	352	40	2	18	15	1	600	437	26	29	7	97	4	600

[1] Shot through left thigh, accidentally, caliber .45, August 15; died next day.

[2] Shot through left knee, while resisting arrest, caliber .45, September 27; died October 15.

[3] Shot through left leg, while intoxicated, November 11; died of tetanus November 24.

Surgical intervention and results, with missile.

VOLUNTEER ARMY, 1898.

Character and location of wounds.	Operation.	Results.		Missile.					
		Recovered.	Died.	Mauser.	Bullet.	Revolver.	Shell.	Shrapnel.	Piece of steel.
Face, fracture	Right lingual artery ligated	....	1	....	1	....	....	....	....
Spine, fracture	Spicula of bone removed	....	1	....	1	....	....	....	....
Thorax, penetrating	Resection fifth rib for empyema	1	....	1	....	....	....	....	....
Abdomen, penetrating	Abdominal incision	....	1	....	....	1	....	....	....
Do	Resection of the intestine	....	1	....	....	1	....	....	....
Back and hip, flesh	Fragment of metal discovered in lumbar region by X-ray; missile not removed.	1	....	....	1	....	....	....	....
Arm, fracture	2 amputations	2	....	....	2	....	....	....	....
Do	Fragments of bone removed	1	....	....	....	....	....	....	1
Do	Incision for drainage	1	....	....	....	....	....	1	....
Forearm, fracture	Amputation	1	....	....	....	....	1	....	....
Do	....do	1	....	....	1	....	....	....	....
Do	Crushed bone removed	1	....	....	1	....	....	....	....
Do	Bullet discovered by X-ray and removed.	1	....	1	....	....	....	....	....
Do	Bullet removed	1	....	1	....	....	....	....	....
Fingers, fracture	9 amputations	9	....	....	9	....	....	....	....
Do	1 amputation	1	....	....	....	....	1	....	....
Do	....do	1	....	....	....	1	....	....	....
Thigh:									
Fracture, upper third	Bullet removed	1	....	1	....	....	....	....	....
Fracture, middle third	Bullet and dead bone removed	1	....	1	....	....	....	....	....
Do	Spiculæ of bone and 2 pieces of lead removed.	1	....	....	1	....	....	....	....
Fracture, lower third	Amputation and reamputation	1	....	....	....	....	1	....	....
Knee joint	Knee joint opened and drained	1	....	....	....	....	....	1	....
Leg, fracture	Amputation	1	....	....	1	....	....	....	....
Tarsus and metatarsus, fracture.	....do	1	....	....	....	....	1	....	....
Toes, fracture	3 amputations	3	....	....	3	....	....	....	....

Regular and Volunteer armies, 1899.—During the year 1899 there were reported from the Army, regulars and volunteers, 2,276 cases of gunshot injury, with 149 deaths, or 6.5 per cent, resulting from the wounds and 4 deaths from causes other than the wounds; 1,714 were returned to duty, 180 were discharged on certificates of disability, 134 by order, and 80 by muster out or expiration of term of service, while 15 remained on sick report at the date of the latest reports.

In addition to these cases, there were killed by gunshot 391 men whose names were not on sick report at the time of their death.

Of the 2,276 cases, 1,759 were wounds received in action; 517 were not battle wounds, but 411 of them were received in the line of duty. One hundred and sixteen of the battle wounds, or 6.6 per cent, had a fatal ending and 136 terminated in discharge for disability.

Of the 2,276 cases, 1,016 occurred among the regular troops, 712 in action, 232 in line of duty, and 72 not in the line of duty. Four of the last-mentioned cases were suicidal and 3 homicidal.

Of the 1,016 cases among the regular troops, 795 were returned to duty, 59 died from effects of their wounds and 3 from other causes, 129 were discharged for disability, 18 by order, and 3 by expiration of term of service, while 9 remained on sick report at the date of last report.

Of the 2,276 cases, 1,260 occurred among the volunteer troops, 1,047 in battle, 179 in the line of duty and 34 not in the line of duty. Only one of the last-mentioned cases was suicidal, none homicidal.

Of the 1,260 cases among the volunteer troops, 919 were returned to duty; 90 died from the effects of their wounds and 1 from other causes, 51 were discharged on certificates of disability, 116 by order, and 77 by muster out, while 6 remained on sick report at the date of last report.

Of the 391 killed by gunshot injury, 333 died in battle, 28 in the line of duty, and 30 not in the line of duty. Fifteen of those last mentioned were cases of suicide and 13 cases of homicide.

Of the 391 killed, 189 were regulars, and of these 148 died in battle, 17 in the line of duty, and 24 not in the line of duty. Ten of those last mentioned were cases of suicide and 12 were cases of homicide.

Of the 391 killed, 202 were volunteers, of whom 185 died in battle, 11 in the line of duty, 5 by suicide, and 1 by homicide.

The site and character of the fatal injury was not reported in 22 of the 391 cases. Of 369 cases in which the location of the injury is specified, 145, or 39.3 per cent, were shot in the head; 131, or 35.5 per cent, in the thorax; 54, or 14.6 per cent, in the abdomen, and 28, or 7.6 per cent, in the neck. The following tabulations show the reported nature of these immediately fatal injuries:

Killed by gunshot.

REGULAR AND VOLUNTEER ARMIES, 1899.

Character and location of wound.	How received.						Nature of missile.										
		Not in action.					In action.						Not in action.				
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Cannon projectile.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Explosion of gun cotton.
Head, fracture	126	6	1	11	1	145	33	20	....	72	...	1	6	9	4	...	....
Face, fracture	1	....	....	....	....	1	....	1	....	....	...	....	....	....	....	...	....
Neck	24	2	....	....	2	28	7	3	....	14	...	....	1	1	2	...	....
Spine, fracture	....	1	....	....	....	1	....	....	....	....	...	....	....	....	....	1	....
Thorax, penetrating	108	13	1	1	8	131	39	23	1	45	...	....	6	11	6	...	....
Abdomen, penetrating	51	2	....	....	1	54	16	8	....	27	...	....	....	2	1	...	....
Pelvis, fracture	1	1	....	....	....	2	1	....	....	....	...	....	....	1	....	...	....
Thigh:																	
Flesh	3	1	....	....	....	4	1	....	....	2	...	....	1	....	....	...	....
Fracture, upper third	2	....	....	....	....	2	1	....	....	....	1	....	....	....	....	...	....
Leg, fracture	1	....	....	....	....	1	....	....	....	....	1	....	....	....	....	...	....
Unknown	16	2	....	3	1	22	1	....	....	15	...	....	....	3	2	...	1
Total	333	28	2	15	13	391	99	55	1	175	2	1	14	27	15	1	1

REGULARS, 1899.

Head, fracture	60	3	1	7	1	72	17	15	....	27	...	1	4	5	3	...	....
Face, fracture	1	....	....	....	....	1	....	1	....	....	...	....	....	....	....	...	....
Neck	10	2	....	....	2	14	5	2	....	3	...	....	1	1	2	...	....
Spine, fracture	....	1	....	....	....	1	....	....	....	....	...	....	....	....	....	1	....
Thorax, penetrating	50	8	1	1	8	68	20	18	1	11	...	....	6	8	4	...	....
Abdomen, penetrating	22	1	....	....	1	24	7	5	....	10	...	....	....	1	1	...	....
Pelvis, fracture	1	....	....	....	....	1	1	....	....	....	...	....	....	....	....	...	....
Thigh, fracture upper third	2	....	....	....	....	2	1	....	....	....	1	....	....	....	....	...	....
Leg, fracture	1	....	....	....	....	1	....	....	....	....	1	....	....	....	....	...	....
Unknown	1	2	....	2	....	5	1	....	....	....	...	....	....	1	2	...	1
Total	148	17	2	10	12	189	52	41	1	51	2	1	11	16	12	1	1

Killed by gunshot—Continued.

VOLUNTEERS, 1899.

Character and location of wound.	How received.						Nature of missile.										
		Not in action.					In action.						Not in action.				
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Cannon projectile.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Explosion of gun cotton.
Head, fracture	66	3	....	4	....	73	16	5	....	45	...	....	2	4	1	....	....
Neck	14	....	....	....	....	14	2	1	....	11	...	....	....	....	....	....	....
Thorax, penetrating	58	5	....	....	....	63	19	5	....	34	...	....	....	3	2	....	....
Abdomen, penetrating	29	1	....	....	....	30	9	3	....	17	...	....	....	1	....	....	....
Pelvis, fracture	.....	1	....	....	....	1	....	....	....	....	...	....	....	1	....	....	....
Thigh, flesh	3	1	....	....	....	4	1	....	....	2	...	....	1	....	....	....	....
Unknown	15	....	....	1	1	17	....	....	....	15	...	....	....	2	....	....	....
Total	185	11	....	5	1	202	47	14	....	124	...	....	3	11	3	....	....

Of the 2,276 gunshot wounds on the sick reports of the Army, regulars and volunteers, in 1899, the site of injury in 8 cases is not stated. In 2,268 cases in which the injured part is specified, the head, face, or neck was wounded in 257 cases, or 11.4 per cent of the whole number; the trunk in 402 cases, or 17.7 per cent; the upper extremity in 763 cases, or 33.6 per cent, and the lower extremity in 846 cases, or 37.3 per cent. But if the 369 cases of death from gunshot in which the site of the fatal wound is specified be added to these 2,268 cases, we have a total of 2,637 cases of gunshot injury, of which 431 injuries of the head, face, and neck constituted 16.4 per cent of the total; 590 of the trunk, 22.4 per cent; 763 of the upper extremity, 28.9 per cent, and 853 of the lower extremity 32.3 per cent.

But a more accurate view of the relative liability of various parts of the body to gunshot injury may be obtained if to the gunshot injuries received in 1899 be added those incurred by the regular and volunteer troops during the year 1898. This gives a total of 4,919 injuries, 845 of which were fatal. The aggregate number of cases in which the location and character of the injury was stated amounted to 4,756, with 757 deaths. The following tabulation shows the distribution of these wounds according as the head, face, and neck, the trunk, or the extremities were the parts injured:

Liability of various parts of the body to gunshot injury, and the dangers resulting from such wounds, years 1898 and 1899.

Site of injury.	Cases.		Deaths.		
	Number.	Per cent of all cases of known sites.	Number.	Per cent of cases of local injury.	Per cent of all cases of known sites.
Head, face, and neck	726	15.26	298	41.05	6.27
Trunk	1,065	22.39	409	38.41	8.60
Upper extremities	1,410	29.65	9	.64	.19
Lower extremities	1,555	32.70	41	2.64	.86
Total known sites	4,756	100.00	757	15.92	15.92
Not stated	163	....	88	....	....
Aggregate	4,919	....	845	....	....

Among the 2,276 gunshot wounds entered on the registers during the calendar year 1899 were 197 injuries of the head and face; 141 of these were flesh wounds, 29 fractures of the cranial bones, and 27 fractures of the bones of the face. No flesh wound was fatal, but the eye had to be enucleated in one of the cases. Fifteen of the patients with cranial fractures died (1 of these in 1900) and 5 recovered, so as to be able to resume their military duties. Depressed bone was removed in 2 cases, one of which was fatal. Enucleation of the eye was performed in 1 case, and the wound is reported as having been closed by sutures in 1 case. Of those who suffered fractures of the facial bones 7 resumed their military duties and 2 died. The recorded surgery in fractures of these bones consisted of the removal of fragments of bone and of portions of a Mauser bullet in 1 case, which ended fatally; the removal of a bullet through the floor of the mouth in 1 case, and enucleation of the eye in 1 case.

Of 60 cases of wound of the neck 41 were returned to duty and 12 died. The only surgical work recorded was the removal of the missile in 2 cases.

Eleven fractures of the spine were reported—8 fatal. The missile was removed in 1 case which recovered and in 1 case which was fatal. Laminectomy was performed in 1 case, which also was fatal. See page 326.

The thorax was injured in 197 cases, 84 nonpenetrating and 113 penetrating wounds. Of the nonpenetrating wounds 1 proved fatal after an operation for traumatic aneurism and 1 recovered after a ligation of the subclavian artery. Of the penetrating wounds 36 cases, or 31.9 per cent of the penetrations, were fatal. The bullet was removed in 1 case which ended fatally and in 6 cases which recovered. The seventh rib was resected in 1 case, and the axillary artery was tied in 1 case with a favorable result.

If the penetrating wounds of the thorax reported in 1898 be added to those just mentioned, the fatal cases are found to constitute 27 per cent of the aggregate. Thus the regular troops in 1898 had 53 cases, 13 fatal, and the volunteer troops 32 cases, 6 fatal, while, as just stated, the regulars and volunteers in 1899 reported 113 cases, 36 fatal. The aggregate number of deaths, 55, forms 27 per cent of the aggregate number of cases, 198.

Of 98 wounds of the abdomen in 1899, 38 were nonpenetrating and 60 penetrating wounds. None of the former was fatal, but 41 of the latter died, constituting 68.3 per cent of the whole number of penetrating wounds. Surgical intervention in these penetrating abdominal wounds included the removal of the missile in 2 cases, the discovery of the bullet by the X-rays in 1 case, and laparotomy in 5 cases, 4 of which were fatal. For the successful case see page 326. In 10 of the 60 penetrating wounds the injured men were able to return to military duty, and in 8 other cases the patients survived the injury.

If the penetrating wounds of the abdomen reported in 1898 be added to those just mentioned, the fatal cases are found to constitute 70 per cent of the aggregate. Thus the regular troops in 1898 had 44 cases, 30 fatal, and the volunteer troops 12 cases, 10 fatal, while, as just stated, the regulars and volunteers in 1899 had 60 cases, 41 fatal. The aggregate number of deaths, 81, forms 70 per cent of the aggregate number of cases, 116.

In one of the gunshot wounds of 1899 the bladder was sutured. This case, which was fatal, is tabulated among wounds of the genito-urinary organs.

One flesh wound of the shoulder proved fatal from hemorrhage from the axillary artery.

The shoulder joint was implicated in 9 cases, 1 fatal; the immediate cause of death not stated.

Of 134 flesh wounds of the arm the patient in 1 case died after amputation at the shoulder joint for injury to the blood vessels. Thirty-two cases of fractured humerus, 3 fatal, were reported. The deaths were due to septic infection after amputation of the arm in 1 case and to axillary hemorrhage in 2 cases, in 1 of which amputation at the shoulder joint was performed for traumatic aneurism and advancing gangrene. Besides this amputation at the shoulder 3 amputations of the arm were performed, 1 of which was fatal from septicæmia, as above stated. A resection of the humerus was performed in one case, and the bullet and fragments of bone were removed in several cases.

In 10 cases in which the elbow joint was injured the only operation recorded was the removal of the bullet and wiring of the fragments of bone in 1 case.

Death from tetanus is recorded in 1 case of flesh wound of the forearm.

In 37 cases of fractured forearm amputation was performed in 2 cases, bullets removed in 2 cases, and pieces of bone removed in 2 cases.

In 21 cases of fractured carpus and metacarpus operations were recorded in 10 cases—in 1 case, which ended fatally, amputation at the shoulder joint for gangrene; in 2 cases, extraction of the bullet; in 1, removal of necrosed bone; in 1, excision of metacarpal bones, and in 5 cases, amputation of the fingers or of the fingers and part of the metacarpal bones.

In 105 cases of fracture of the fingers, 54 amputations were performed.

The hip joint was reported injured only in 1 case; pieces of bone were removed, and the patient on recovery was discharged as unfit for further military duty.

In 362 flesh wounds of the thigh 7 cases ended fatally—1 from septic infection; 1 from gangrene; 2 from hemorrhage, in 1 of which the femoral artery was ligated; 1 is said to have died in the operating room, while in 2 cases no reference is made to the immediate cause of death. The bullet was discovered by the X-rays and removed in 1 case; the femoral artery was ligated in 2 cases, the patient recovering in 1 case, a Mauser wound, and dying in the other, a Remington wound; the leg was amputated in 1 case for gangrene, resulting from injury to the popliteal artery, and the thigh in another also for gangrene, both ending favorably.

Seventeen fractures of the femur in its upper third were recorded, with 3 deaths. The only surgical work reported in connection with these fractures is the removal of the bullet in 3 cases.

Seventeen fractures of the femur in its middle third were recorded, with 2 deaths (1 of the latter having occurred in 1900). The bullet was removed in 1 case and necrosed bone in 1 case; resection was performed in 1 case and amputation (in 1900) in 1 case, which was fatal.

Nine fractures of the lower third of the femur, none fatal, were recorded. The bullet was extracted in 1 case; dead bone was removed and sinuses curetted in 1 case.

In 24 injuries implicating the knee joint, 1 proved fatal, death having occurred in 1900 after amputation of the thigh. The missile was removed in 4 cases and amputation was performed in 1 case, the patient recovering.

In 186 flesh wounds of the leg 1 death was reported from shock following operation for severed tibial artery. In 1 case the missile was discovered by the X-rays and removed, and in 1 case the external popliteal nerve was resected.

The bones of the leg were fractured in 54 cases, 5 fatal. Death resulted from tetanus in 1 case, septic infection in 2 cases; in 1 case the patient is recorded as having died from the effects of wounds received in action, and in 1 case no reference is made to the immediate cause of death. The surgical work reported consisted of the removal of the bullet in 1 case, of the bullet and spiculæ of bone in 1 case, of scales of lead in 1 case, and of the bullet and necrosed bone in 1 case. Formal replacement of fragments is reported in 2 cases and amputation in 4 cases.

One death from tetanus occurred in 120 cases of flesh wound of the foot.

The surgical work on the injuries of the ankle and foot consisted of the removal of bullets, fragments of bone, and of necrosed bone, with amputation of the foot in 2 cases and of the toes in 4 cases.

The following tabulations present the statistical details of the 2,276 gunshot wounds reported from the Regular and Volunteer armies during the year 1899. They consist of five sets, in the following order:

I.—Regulars and volunteers:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
II.—Regulars:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
III.—Volunteers:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
IV.—Gunshot wounds which terminated fatally in:
  (*a*) Regulars and volunteers.
  (*b*) Regulars.
  (*c*) Volunteers.
V.—Surgical operations for gunshot wounds.
  Regulars and volunteers.

I.—REGULAR AND VOLUNTEER ARMIES, 1899.

(a) *All gunshot wounds.*

Character and location of wound.	How received.						Nature of missile.																Disposition.							
		Not in action.																												
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Revolver.	Small shot.	Shell.	Canister.	Shrapnel.	Splinter.	Explosion of gun.	Explosion of cartridge.	Explosion of primer.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Death, other causes.	Remaining last report.	Total.
Head:																														
Flesh	84	3	1	...	...	88	33	11	...	38	1	...	1	...	1	...	...	1	2	...	...	88	84	...	...	2	2	...	...	88
Fracture	25	2	...	1	1	29	14	6	...	7	...	...	1	...	1	...	...	...	...	...	...	29	5	4	15	2	1	1	1	29
Face:																														
Flesh	44	7	2	...	...	53	18	8	...	20	...	...	2	...	2	...	...	...	1	2	...	53	45	2	...	5	1	...	...	53
Fracture	24	1	2	...	...	27	13	6	...	7	...	...	1	...	...	...	...	...	...	...	...	27	7	8	2	5	4	1	...	27
Neck	51	6	3	...	...	60	29	11	2	17	...	...	1	...	...	...	...	...	...	...	...	60	41	3	12	2	2	...	...	60
Spine, fracture	8	1	2	...	...	11	3	3	1	4	...	...	...	...	...	...	...	...	...	...	...	11	...	2	8	...	1	...	...	11
Thorax:																														
Nonpenetrating	61	19	4	...	...	84	24	22	2	29	...	...	5	...	...	...	...	...	1	1	...	84	74	1	1	3	3	...	2	84
Penetrating	95	10	4	3	1	113	48	32	4	27	...	...	2	...	...	...	...	...	...	...	...	113	49	13	36	11	3	...	1	113
Abdomen:																														
Nonpenetrating	33	3	2	...	...	38	15	5	...	16	...	...	2	...	...	...	...	...	...	...	...	38	37	1	...	...	...	...	...	38
Penetrating	49	8	2	...	1	60	31	9	2	14	...	...	4	...	...	...	...	...	...	...	...	60	10	4	41	1	3	...	1	60
Pelvis, fracture	4	...	...	...	...	4	1	...	...	3	...	...	...	...	...	...	...	...	...	...	...	4	2	...	2	...	...	...	...	4
Back and hip, flesh	74	4	...	...	...	78	34	25	1	13	...	...	2	...	3	...	...	...	...	...	...	78	63	5	...	8	1	1	...	78
Perineum, genital and urinary organs	12	1	1	...	...	14	3	4	...	5	...	...	2	...	...	...	...	...	...	...	...	14	10	...	3	...	1	...	...	14
Shoulder:																														
Flesh	97	10	4	...	...	111	44	28	1	34	...	...	1	...	1	...	1	...	1	...	...	111	91	4	1	9	5	1	...	111
Fracture clavicle or scapula	3	...	...	...	...	3	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	3	2	...	...	1	...	...	...	3
Joint	8	1	...	...	...	9	3	4	1	1	...	...	...	...	...	...	...	...	...	...	...	9	4	3	1	...	1	...	...	9
Arm:																														
Flesh	121	9	4	...	...	134	65	24	1	40	...	...	3	...	...	...	...	1	...	...	...	134	115	5	1	9	4	...	...	134
Fracture	27	4	...	1	...	32	16	10	3	1	...	...	2	...	...	...	...	...	...	...	...	32	13	10	3	4	2	...	...	32
Elbow joint	8	2	...	...	...	10	4	4	...	2	...	...	...	...	...	...	...	...	...	...	...	10	3	5	...	1	1	...	...	10
Forearm:																														
Flesh	115	15	2	...	...	132	59	27	3	38	...	...	3	...	1	...	...	...	1	...	...	132	123	4	1	4	...	...	...	132
Fracture	29	5	3	...	...	37	7	15	1	11	...	...	1	...	...	...	1	...	...	1	...	37	23	8	...	4	2	...	...	37
Wrist joint	...	2	...	...	...	2	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	...	...	...	2
Hand, flesh	95	55	17	...	...	167	42	18	13	69	...	1	17	...	...	...	...	...	4	2	1	167	159	2	...	3	3	...	...	167

Carpus and metacarpus, fracture	8	10	3			21	2	3	6	7			2	1								21	16	4	1					21
Fingers, fracture	15	76	14			105	5	5	31	52			11	1								105	82	19		4				105
Hip joint	1					1		1														1		1						1
Thigh:																														
Flesh	321	31	10			362	151	104	6	86			10		4		1					362	294	20	7	22	15		4	362
Fracture upper third	15	2				17	9	6	1				1									17	5	2	3	5	2			17
Fracture middle third	16		1			17	12	2		2						1						17	4	5	2	3	2		1	17
Fracture lower third	9					9	5	4														9	2	5		1			1	9
Kneejoint	22	2				24	10	7	1	6												24	8	8	1	4	3			24
Leg:																														
Flesh	145	35	6			186	82	29	7	57			10		1							186	163	8	1	6	8			186
Fracture	44	7	3			54	20	19	3	8			2		2							54	26	12	5	6	5			54
Ankle joint	5	1				6	1	2	1	2												6	4	2						6
Foot, flesh	65	49	6			120	33	11	27	40			9									120	100	5	1	8	3		3	120
Tarsus and metatarsus, fracture	15	14	1			30	7	5	7	10			1									30	24	4			1		1	30
Toes, fracture	7	13				20	6		5	8			1									20	18			1	1			20
Unknown	4	3	1			8	2			5			1									8	7		1					8
Total	1,759	411	98	5	3	2,276	851	471	131	682	1	1	98	2	16	1	3	2	10	6	1	2,276	1,714	180	149	134	80	4	[1]15	2,276

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[1] On December 31, 1899, there remained on sick report 216 cases, but since that date 134 cases have been returned to duty, 61 discharged on certificates of disability, 1 discharged by order, 2 by expiration of term of service, and 3 died. The cases fatal in 1900 comprised 1 case of kneejoint injury, 1 of the 2 fatal cases of fracture of the middle third of the femur, and 1 of the 15 fatal cases of fracture of the cranium.

I.—REGULAR AND VOLUNTEER ARMIES, 1899.

(*b*) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.													Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Shell.	Canister.	Shrapnel.	Splinters.	Explosion of gun.	Explosion of primer.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Death, other causes.	Remaining last report.	Total.
Head:																					
Flesh	33	11	....	35	1	....	1	....	....	1	2	....	84	80	......	......	2	2	......	......	84
Fracture	14	6	....	4	....	....	1	....	....	....	....	....	25	5	4	11	2	1	1	1	25
Face:																					
Flesh	17	6	....	19	....	....	1	....	....	....	1	....	44	37	1	......	5	1	......	......	44
Fracture	13	6	....	5	....	....	....	....	....	....	....	....	24	5	7	2	5	4	1	......	24
Neck	29	11	....	11	....	....	....	....	....	....	....	....	51	36	3	9	2	1	......	......	51
Spine, fracture	3	3	1	1	....	....	....	....	....	....	....	....	8	......	2	5	......	1	......	......	8
Thorax:																					
Nonpenetrating	20	21	....	19	....	....	....	....	....	....	1	....	61	52	1	1	3	3	......	1	61
Penetrating	48	32	....	15	....	....	....	....	....	....	....	....	95	41	12	28	11	2	......	1	95
Abdomen:																					
Nonpenetrating	14	5	....	14	....	....	....	....	....	....	....	....	33	32	1	......	......	......	......	......	33
Penetrating	31	8	....	10	....	....	....	....	....	....	....	....	49	10	3	31	1	3	......	1	49
Pelvis, fracture	1	......	....	3	....	....	....	....	....	....	....	....	4	2	......	2	......	......	......	......	4
Back and hip, flesh	33	24	1	13	....	....	3	....	....	....	....	....	74	60	5	......	7	1	1	......	74
Perineum, genital and urinary organs	3	4	....	5	....	....	....	....	....	....	....	....	12	8	......	3	......	1	......	......	12
Shoulder:																					
Flesh	40	26	....	28	....	....	1	....	1	....	1	....	97	78	4	1	9	4	1	......	97
Fracture clavicle and scapula	......	1	....	2	....	....	....	....	....	....	....	....	3	2	......	......	1	......	......	......	3
Joint	3	4	....	1	....	....	....	....	....	....	....	....	8	3	3	1	......	1	......	......	8
Arm:																					
Flesh	61	23	1	35	....	....	....	....	....	1	....	....	121	103	4	1	9	4	......	......	121
Fracture	16	10	....	1	....	....	....	....	....	....	....	....	27	12	6	3	4	2	......	......	27
Elbow joint	4	4	....	......	....	....	....	....	....	....	....	....	8	3	4	......	1	......	......	......	8
Forearm:																					
Flesh	57	25	....	31	....	....	1	....	....	....	1	....	115	108	3	......	2	......	......	......	115
Fracture	7	15	....	6	....	....	....	....	1	....	....	....	29	17	6	......	4	2	......	......	29
Hand, flesh	41	16	2	32	....	1	....	....	....	....	2	1	95	89	1	......	4	3	......	......	95
Carpus and metacarpus, fracture	2	3	....	3	....	....	....	....	....	....	....	....	8	6	2	......	......	......	......	......	8
Fingers, fracture	4	5	....	6	....	....	....	....	....	....	....	....	15	14	1	......	......	......	......	......	15

Hip joint		1											1		1						1
Thigh:																					
Flesh	151	101	2	64			3						321	260	19	6	20	13		3	321
Fracture upper third	9	6											15	5		3	5	2			15
Fracture middle third	12	2		1				1					16	4	5	2	3	1		1	16
Fracture lower third	5	4											9	2	5		1			1	9
Kneejoint	10	7		5									22	6	8	1	4	3			22
Leg:																					
Flesh	77	29	1	38									145	128	6	1	5	5			145
Fracture	20	19		3			2						44	18	11	5	5	5			44
Ankle joint	1	2		2									5	3	2						5
Foot, flesh	32	11	1	21									65	56	3		3	2		1	65
Tarsus and metatarsus, fracture	7	4		4									15	12	3						15
Toes, fracture	6			1									7	6			1				7
Unknown	2			2									4	4							4
Total	826	455	9	440	1	1	13	1	2	2	8	1	1,759	1,307	136	116	119	67	4	[1]10	1,759

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[1] On December 31, 1899, there remained on sick report 106 cases, but since that date 87 cases have been returned to duty, 44 discharged for disability, 2 discharged by expiration of term of service, and 3 died. The deaths include 1 of the 11 cases of cranial fracture, 1 of the 2 fatal cases of fractured femur in its middle third, and 1 of kneejoint injury.

I.—REGULAR AND VOLUNTEER ARMIES, 1899.

(c) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.					Nature of missile.											Disposition.					
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Explosion of cartridge.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Remaining last report.	Total.
Head:																							
Flesh	3	1	....	....	4	....	....	......	3	1	....	....	....	....	....	4	4	......	....	......	......	......	4
Fracture	2	......	1	1	4	....	....	......	3	1	....	....	....	....	....	4	......	......	4	......	......	......	4
Face:																							
Flesh	7	2	....	....	9	1	2	......	1	2	....	1	....	2	....	9	8	1	....	......	......	......	9
Fracture	1	2	....	....	3	....	....	......	2	1	....	....	....	....	....	3	2	1	....	......	......	......	3
Neck	6	3	....	....	9	....	....	2	6	1	....	....	....	....	....	9	5	......	3	......	1	......	9
Spine, fracture	1	2	....	....	3	....	....	......	3	......	....	....	....	....	....	3	......	......	3	......	......	......	3
Thorax:																							
Nonpenetrating	19	4	....	....	23	4	1	2	10	5	....	....	....	1	....	23	22	......	....	......	......	1	23
Penetrating	10	4	3	1	18	....	....	4	12	2	....	....	....	....	....	18	8	1	8	......	1	......	18
Abdomen:																							
Nonpenetrating	3	2	....	....	5	1	....	......	2	2	....	....	....	....	....	5	5	......	....	......	......	......	5
Penetrating	8	2	....	1	11	....	1	2	4	4	....	....	....	....	....	11	......	1	10	......	......	......	11
Back and hip, flesh	4	......	....	....	4	1	1	......	......	2	....	....	....	....	....	4	3	......	....	1	......	......	5
Perineum, genital and urinary organs	1	1	....	....	2	....	....	......	......	2	....	....	....	....	....	2	2	......	....	......	......	......	2
Shoulder:																							
Flesh	10	4	....	....	14	4	2	1	6	1	....	....	....	....	....	14	13	......	....	......	1	......	14
Joint	1	......	....	....	1	....	....	1	......	......	....	....	....	....	....	1	1	......	....	......	......	......	1
Arm:																							
Flesh	9	4	....	....	13	4	1	......	5	3	....	....	....	....	....	13	12	1	....	......	......	......	13
Fracture	4	......	1	....	5	....	....	3	......	2	....	....	....	....	....	5	1	4	....	......	......	......	5
Elbow joint	2	......	....	....	2	....	....	......	2	......	....	....	....	....	....	2	......	1	....	......	1	......	2
Forearm:																							
Flesh	15	2	....	....	17	2	2	3	7	3	....	....	....	....	....	17	15	1	1	......	......	......	17
Fracture	5	3	....	....	8	....	....	1	5	1	....	....	....	1	....	8	6	2	....	......	......	......	8
Wrist joint	2	......	....	....	2	....	....	1	1	......	....	....	....	....	....	2	1	1	....	......	......	......	2
Hand, flesh	55	17	....	....	72	1	2	11	37	17	....	....	....	2	2	72	70	1	....	1	......	......	72
Carpus and metacarpus, fracture	10	3	....	....	13	....	....	6	4	2	1	....	....	....	....	13	10	2	1	......	......	......	13

Fingers, fracture	76	14	....	....	90	1	....	31	46	11	1	....	....	....	....	90	68	18	....	4	......	......	90
Thigh:																							
Flesh	31	10	....	....	41	....	3	4	22	10	....	1	1	....	....	41	31	1	1	2	2	1	41
Fracture upper third	2	......	....	....	2	....	....	1	......	1	....	....	....	....	....	2	......	2	....	......	......	......	2
Fracture middle third	......	1	....	....	1	....	....	......	1	......	....	....	....	....	....	1	......	......	....	......	1	......	1
Kneejoint	2	......	....	....	2	....	....	1	1	......	....	....	....	....	....	2	2	......	....	......	......	......	2
Leg:																							
Flesh	35	6	....	....	41	5	....	6	19	10	....	1	....	....	....	41	35	2	....	1	3	......	41
Fracture	7	3	....	....	10	....	....	3	5	2	....	....	....	....	....	10	8	1	....	1	......	......	10
Ankle joint	1	......	....	....	1	....	....	1	......	......	....	....	....	....	....	1	1	......	....	......	......	......	1
Foot, flesh	49	6	....	....	55	1	....	26	19	9	....	....	....	....	....	55	44	2	1	5	1	2	55
Tarsus and metatarsus, fracture	14	1	....	....	15	....	1	7	6	1	....	....	....	....	....	15	12	1	....	......	1	1	15
Toes, fracture	13	......	....	....	13	....	....	5	7	1	....	....	....	....	....	13	12	......	....	......	1	......	13
Unknown	3	1	....	....	4	....	....	......	3	1	....	....	....	....	....	4	3	......	1	......	......	......	4
Total	411	98	5	3	517	25	16	122	242	98	2	3	1	6	2	517	407	44	33	15	13	15	517

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[1] On December 31, 1899, there remained on sick report 70 cases, but since that date 47 cases have been returned to duty, 17 discharged for disability, and 1 discharged by order.

II.—REGULAR ARMY, 1899.

(*a*) *All gunshot wounds.*

Character and location of wound.	How received.						Nature of missile.															Disposition.							
		Not in action.																											
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Revolver.	Small shot.	Shell.	Canister.	Shrapnel.	Splinter.	Explosion of cartridge.	Explosion of primer.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service.	Death, other causes.	Remaining last report.	Total.
Head:																													
Flesh	37	1	...	...	...	38	17	8	...	11	1	...	...	...	1	...	...	...	...	...	38	38	...	...	...	...	...	...	38
Fracture	10	...	...	...	1	11	6	3	...	...	...	...	1	...	1	...	...	...	...	...	11	3	3	4	...	...	1	...	11
Face:																													
Flesh	15	5	2	...	...	22	7	4	...	7	...	...	2	...	1	...	...	...	1	...	22	21	...	...	1	...	...	...	22
Fracture	8	1	2	...	...	11	4	3	...	3	...	...	1	...	...	...	...	...	...	...	11	3	5	2	...	...	1	...	11
Neck	16	1	3	...	...	20	11	3	1	5	...	...	...	...	...	...	...	...	...	...	20	14	3	3	...	...	...	...	20
Spine, fracture	5	1	2	...	...	8	2	2	1	3	...	...	...	...	...	...	...	...	...	...	8	...	1	7	...	...	...	...	8
Thorax:																													
Nonpenetrating	23	8	3	...	...	34	13	10	1	6	...	...	4	...	...	...	...	...	...	...	34	32	1	...	...	...	...	1	34
Penetrating	34	5	3	3	1	46	15	15	4	10	...	...	2	...	...	...	...	...	...	...	46	23	8	13	1	...	...	1	46
Abdomen:																													
Nonpenetrating	9	...	...	...	...	9	6	1	...	2	...	...	...	...	...	...	...	...	...	...	9	8	1	...	...	...	...	...	9
Penetrating	18	3	1	...	1	23	13	4	2	3	...	...	1	...	...	...	...	...	...	...	23	4	4	14	1	...	...	...	23
Pelvis, fracture	3	...	...	...	...	3	1	...	...	2	...	...	...	...	...	...	...	...	...	...	3	2	...	1	...	...	...	...	3
Back and hip, flesh	25	2	...	...	...	27	10	11	1	1	...	...	1	...	3	...	...	...	...	...	27	24	3	...	...	...	...	...	27
Perineum, genital and urinary organs	5	1	1	...	...	7	3	1	...	1	...	...	2	...	...	...	...	...	...	...	7	7	...	...	...	...	...	...	7
Shoulder:																													
Flesh	29	4	4	...	...	37	13	11	...	11	...	...	1	...	1	...	...	...	...	...	37	33	2	...	1	...	1	...	37
Joint	5	1	...	...	...	6	3	2	1	...	...	...	...	...	...	...	...	...	...	...	6	4	2	...	...	...	...	...	6
Arm:																													
Flesh	45	3	3	...	...	51	23	12	1	12	...	...	2	...	...	...	...	1	...	...	51	44	5	1	...	1	...	...	51
Fracture	13	3	...	1	...	17	11	2	3	...	...	...	1	...	...	...	...	...	...	...	17	9	8	...	...	...	...	...	17
Elbow joint	6	1	...	...	...	7	3	3	...	1	...	...	...	...	...	...	...	...	...	...	7	3	4	...	...	...	...	...	7
Forearm:																													
Flesh	53	10	2	...	...	65	31	14	3	14	...	...	2	...	1	...	...	...	...	...	65	62	2	1	...	...	...	...	65
Fracture	11	2	3	...	...	16	3	6	1	4	...	...	1	...	...	...	...	...	1	...	16	10	5	...	1	...	...	...	16
Wrist joint	...	1	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1
Hand, flesh	35	29	12	...	...	76	21	9	10	21	...	1	13	...	...	...	...	...	...	1	76	73	1	...	1	1	...	...	76
Carpus and metacarpus, fracture	5	7	3	...	...	15	1	3	5	4	...	...	1	1	...	...	...	...	...	...	15	11	3	1	...	...	...	...	15
Fingers, fracture	12	50	11	...	...	73	4	3	25	33	...	...	7	1	...	...	...	...	...	...	73	60	13	...	...	...	...	...	73

Hip joint	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1
Thigh:																													
Flesh	132	15	4	...	...	151	72	40	4	27	...	...	5	...	2	...	1	...	...	...	151	128	13	4	3	...	...	3	151
Fracture upper third	3	2	...	...	...	5	1	2	1	...	...	...	1	...	...	...	...	...	...	...	5	2	2	1	...	...	...	...	5
Fracture middle third	9	...	...	...	...	9	6	2	...	...	...	...	...	...	...	1	...	...	...	...	9	2	5	1	1	...	...	...	9
Fracture lower third	7	...	...	...	...	7	3	4	...	...	...	...	...	...	...	...	...	...	...	...	7	2	4	...	...	...	...	1	7
Kneejoint	7	1	...	...	...	8	3	3	1	1	...	...	...	...	...	...	...	...	...	...	8	2	5	1	...	...	...	...	8
Leg:																													
Flesh	64	17	2	...	...	83	37	15	6	17	...	...	8	...	...	...	...	...	...	...	83	75	6	...	1	1	...	...	83
Fracture	24	6	2	...	...	32	13	8	2	6	...	...	2	...	1	...	...	...	...	...	32	18	8	4	2	...	...	...	32
Ankle joint	4	...	...	...	...	4	1	2	...	1	...	...	...	...	...	...	...	...	...	...	4	2	2	...	...	...	...	...	4
Foot, flesh	25	33	1	...	...	59	11	7	21	17	...	...	3	...	...	...	...	...	...	...	59	47	5	1	4	...	...	2	59
Tarsus and metatarsus, fracture	7	10	...	...	...	17	4	2	6	4	...	...	1	...	...	...	...	...	...	...	17	13	3	...	...	...	...	1	17
Toes, fracture	6	8	...	...	...	14	6	...	5	2	...	...	1	...	...	...	...	...	...	...	14	13	...	...	1	...	...	...	14
Unknown	1	1	1	...	...	3	1	...	...	1	...	...	1	...	...	...	...	...	...	...	3	3	...	...	...	...	...	...	3
Total	712	232	65	4	3	1,016	379	216	106	230	1	1	64	2	11	1	1	1	2	1	1,016	795	129	59	18	3	3	[1]9	1,016

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[1] On December 31, 1899, there remained on sick report 150 cases, but since that date 85 cases have been returned to duty, 52 discharged for disability, 1 discharged by order and 2 by expiration of term of service, and 1 died. The fatal case was one of injury to the kneejoint.

II.—REGULAR ARMY, 1899.

(b) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.											Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Shell.	Canister.	Splinters.	Explosion of primer.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service.	Death, other causes.	Remaining last report.	Total.
Head:																			
Flesh	17	8		10	1		1				37	37							37
Fracture	6	3					1				10	3	3	3			1		10
Face:																			
Flesh	6	3		6							15	14			1				15
Fracture	4	3		1							8	1	4	2			1		8
Neck	11	3		2							16	12	3	1					16
Spine, fracture	2	2	1								5		1	4					5
Thorax:																			
Nonpenetrating	10	9		4							23	21	1					1	23
Penetrating	15	15		4							34	17	7	8	1			1	34
Abdomen:																			
Nonpenetrating	6	1		2							9	8	1						9
Penetrating	13	3		2							18	4	3	10	1				18
Pelvis, fracture	1			2							3	2		1					3
Back and hip, flesh	10	10	1	1			3				25	22	3						25
Perineum, genital and urinary organs	3	1		1							5	5							5
Shoulder:																			
Flesh	11	10		7			1				29	25	2		1		1		29
Joint	3	2									5	3	2						5
Arm:																			
Flesh	23	11	1	9					1		45	39	4	1		1			45
Fracture	11	2									13	8	5						13
Elbow joint	3	3									6	3	3						6
Forearm:																			
Flesh	30	13		9			1				53	52	1						53
Fracture	3	6		2							11	6	4		1				11
Wrist joint																			
Hand, flesh	20	7	1	5		1				1	35	34				1			35
Carpus and metacarpus, fracture	1	3		1							5	3	2						5
Fingers, fracture	4	3		5							12	12							12

Hip joint	......	1	......	......	......	......	......	......	......	......	1	......	1	......	......	......	......	......	1
Thigh:																			
Flesh	72	40	1	17	......	......	2	......	......	......	132	110	13	4	3	......	......	2	132
Fracture upper third	1	2	......	......	......	......	......	......	......	......	3	2	......	1	......	......	......	......	3
Fracture middle third	6	2	......	......	......	......	......	1	......	......	9	2	5	1	1	......	......	......	9
Fracture lower third	3	4	......	......	......	......	......	......	......	......	7	2	4	......	......	......	......	1	7
Kneejoint	3	3	......	1	......	......	......	......	......	......	7	1	5	1	......	......	......	......	7
Leg:																			
Flesh	37	15	1	11	......	......	......	......	......	......	61	58	4	......	1	1	......	......	61
Fracture	13	8	......	2	......	......	1	......	......	......	24	12	7	4	1	......	......	......	24
Ankle joint	1	2	......	1	......	......	......	......	......	......	4	2	2	......	......	......	......	......	4
Foot, flesh	11	7	1	6	......	......	......	......	......	......	25	20	3	......	1	......	......	1	25
Tarsus and metatarsus, fracture	4	1	......	2	......	......	......	......	......	......	7	5	2	......	......	......	......	......	7
Toes, fracture	6	......	......	......	......	......	......	......	......	......	6	5	......	......	1	......	......	......	6
Unknown	1	......	......	......	......	......	......	......	......	......	1	1	......	......	......	......	......	......	1
Total	371	206	7	113	1	1	10	1	1	1	712	551	95	41	13	3	3	[1]6	712

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[1] On December 31, 1899, there remained on sick report 100 cases, but since that date 52 cases were returned to duty, 39 discharged for disability, 2 discharged on account of expiration of term of service, and 1 died—the last a case of kneejoint injury.

II. REGULAR ARMY, 1899.

(c) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.					Nature of missile.										Disposition.					
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Explosion of cartridge.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Remaining last report.	Total.
Head:																					
Flesh	1	....	....	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	1
Fracture	....	....	....	1	1	....	....	....	....	1	....	....	....	....	1	....	....	1	....	....	1
Face:																					
Flesh	5	2	....	....	7	1	1	....	1	2	....	1	....	1	7	7	....	....	....	....	7
Fracture	1	2	....	....	3	....	....	....	2	1	....	....	....	....	3	2	1	....	....	....	3
Neck	1	3	....	....	4	....	....	1	3	....	....	....	....	....	4	2	....	2	....	....	4
Spine, fracture	1	2	....	....	3	....	....	....	3	....	....	....	....	....	3	....	....	3	....	....	3
Thorax:																					
Nonpenetrating	8	3	....	....	11	3	1	1	2	4	....	....	....	....	11	11	....	....	....	....	11
Penetrating	5	3	3	1	12	....	....	4	6	2	....	....	....	....	12	6	1	5	....	....	12
Abdomen:																					
Nonpenetrating	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Penetrating	3	1	....	1	5	....	1	2	1	1	....	....	....	....	5	....	1	4	....	....	5
Pelvis, fracture	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Back and hip, flesh	2	....	....	....	2	....	1	....	....	1	....	....	....	....	2	2	....	....	....	....	2
Perineum, genital and urinary organs	1	1	....	....	2	....	....	....	....	2	....	....	....	....	2	2	....	....	....	....	2
Shoulder:																					
Flesh	4	4	....	....	8	2	1	....	4	1	....	....	....	....	8	8	....	....	....	....	8
Fracture clavicle or scapula	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Joint	1	....	....	....	1	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	1
Arm:																					
Flesh	3	3	....	....	6	....	1	....	3	2	....	....	....	....	6	5	1	....	....	....	6
Fracture	3	....	1	....	4	....	....	3	....	1	....	....	....	....	4	1	3	....	....	....	4
Elbow joint	1	....	....	....	1	....	....	....	1	....	....	....	....	....	1	....	1	....	....	....	1
Forearm:																					
Flesh	10	2	....	....	12	1	1	3	5	2	....	....	....	....	12	10	1	1	....	....	12
Fracture	2	3	....	....	5	....	....	1	2	1	....	....	....	1	5	4	1	....	....	....	5
Wrist joint	1	....	....	....	1	....	....	1	....	....	....	....	....	....	1	....	1	....	....	....	1
Hand, flesh	29	12	....	....	41	1	2	9	16	13	....	....	....	....	41	39	1	....	1	....	41
Carpus and metacarpus, fracture	7	3	....	....	10	....	....	5	3	1	1	....	....	....	10	8	1	1	....	....	10

Fingers, fracture	50	11	....	....	61	......	......	25	28	7	1	....	....	....	61	48	13	......	......	......	61
Thigh:																					
Flesh	15	4	....	....	19	......	......	3	10	5	....	....	1	....	19	18	......	......	......	1	19
Fracture upper third	2	......	....	....	2	......	......	1	......	1	....	....	....	....	2	......	2	......	......	......	2
Kneejoint	1	......	....	....	1	......	......	1	......	......	....	....	....	....	1	1	......	......	......	......	1
Leg:																					
Flesh	17	2	....	....	19	......	......	5	6	8	....	....	....	....	19	17	2	......	......	......	19
Fracture	6	2	....	....	8	......	......	2	4	2	....	....	....	....	8	6	1	......	1	......	8
Foot, flesh	33	1	....	....	31	......	......	20	11	3	....	....	....	....	34	27	2	1	3	1	31
Tarsus and metatarsus, fracture	10	......	....	....	10	......	1	6	2	1	....	....	....	....	10	8	1	......	......	1	10
Toes, fracture	8	......	....	....	8	......	......	5	2	1	....	....	....	....	8	8	......	......	......	......	8
Unknown	1	1	....	....	2	......	......	......	1	1	....	....	....	....	2	2	......	......	......	......	2
Total	232	65	4	3	304	8	10	99	117	64	2	1	1	2	301	244	34	18	5	13	304

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[1] On December 31, 1899, there remained on sick report 50 cases, but since that date 33 cases have been returned to duty, 13 discharged for disability, and 1 by order.

III.—VOLUNTEER ARMY, 1899

(a) *All gunshot wounds.*

Character and location of wound.	How received.					Nature of missile.											Disposition.							
		Not in action.																						
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shell.	Shrapnel.	Splinter.	Explosion of gun.	Explosion of cartridge.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Death, other causes.	Remaining last report.	Total.
Head:																								
Flesh	47	2	1	....	50	16	3	....	27	1	....	....	1	2	....	50	46	....	....	2	2	....	....	50
Fracture	15	2	....	1	18	8	3	....	7	....	....	....	....	....	....	18	2	1	11	2	1	....	1	18
Face:																								
Flesh	29	2	....	....	31	11	4	....	13	....	1	....	....	1	1	31	24	2	....	4	1	....	....	31
Fracture	16	....	....	....	16	9	3	....	4	....	....	....	....	....	....	16	4	3	....	5	4	....	....	16
Neck	35	5	....	....	40	18	8	1	12	1	....	....	....	....	....	40	27	....	9	2	2	....	....	40
Spine, fracture	3	....	....	....	3	1	1	....	1	....	....	....	....	....	....	3	....	1	1	....	1	....	....	3
Thorax:																								
Nonpenetrating	38	11	1	....	50	11	12	1	23	1	....	....	....	1	1	50	42	....	1	3	3	....	1	50
Penetrating	61	5	1	....	67	33	17	....	17	....	....	....	....	....	....	67	26	5	23	10	3	....	....	67
Abdomen:																								
Nonpenetrating	24	3	2	....	29	9	4	....	14	2	....	....	....	....	....	29	29	....	....	....	....	....	....	29
Penetrating	31	5	1	....	37	18	5	....	11	3	....	....	....	....	....	37	6	....	27	....	3	....	1	37
Pelvis, fracture	1	....	....	....	1	....	....	....	1	....	....	....	....	....	....	1	....	....	1	....	....	....	....	1
Back and hip, flesh	49	2	....	....	51	24	14	....	12	1	....	....	....	....	....	51	39	2	....	8	1	1	....	51
Perineum, genital and urinary organs	7	....	....	....	7	....	3	....	4	....	....	....	....	....	....	7	3	....	3	....	1	....	....	7
Shoulder:																								
Flesh	68	6	....	....	74	31	17	1	23	....	....	1	....	1	....	74	58	2	1	8	5	....	....	74
Fracture clavicle or scapula	3	....	....	....	3	....	1	....	2	....	....	....	....	....	....	3	2	....	....	1	....	....	....	3
Joint	3	....	....	....	3	....	2	....	1	....	....	....	....	....	....	3	....	1	1	....	1	....	....	3
Arm:																								
Flesh	76	6	1	....	83	42	12	....	28	1	....	....	....	....	....	83	71	....	....	9	3	....	....	83
Fracture	14	1	....	....	15	5	8	....	1	1	....	....	....	....	....	15	4	2	3	4	2	....	....	15
Elbow joint	2	1	....	....	3	1	1	....	1	....	....	....	....	....	....	3	....	1	....	1	1	....	....	3
Forearm:																								
Flesh	62	5	....	....	67	28	13	....	24	1	....	....	....	1	....	67	61	2	....	4	....	....	....	67
Fracture	18	3	....	....	21	4	9	....	7	....	....	1	....	....	....	21	13	3	....	3	2	....	....	21
Wrist joint	....	1	....	....	1	....	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	....	....	1
Hand, flesh	60	26	5	....	91	21	9	3	48	4	....	....	....	4	2	91	86	1	....	2	2	....	....	91
Carpus and metacarpus, fracture	3	3	....	....	6	1	....	1	3	1	....	....	....	....	....	6	5	1	....	....	....	....	....	6

Fingers, fracture	3	26	3	....	32	1	2	6	19	4	....	....	....	....	....	32	22	6	....	4	....	....	....	32
Thigh:																								
Flesh	189	16	6	....	211	79	64	2	59	5	2	....	....	....	....	211	166	7	3	19	15	....	1	211
Fracture upper third	12	....	....	....	12	8	4	....	....	....	....	....	....	....	....	12	3	....	2	5	2	....	....	12
Fracture middle third	7	....	1	....	8	6	....	....	2	....	....	....	....	....	....	8	2	....	1	2	2	....	1	8
Fracture lower third	2	....	....	....	2	2	....	....	....	....	....	....	....	....	....	2	....	1	....	1	....	....	....	2
Kneejoint	15	1	....	....	16	7	4	....	5	....	....	....	....	....	....	16	6	3	....	4	3	....	....	16
Leg:																								
Flesh	81	18	4	....	103	45	14	1	40	2	1	....	....	....	....	103	88	2	1	5	7	....	....	103
Fracture	20	1	1	....	22	7	11	1	2	....	1	....	....	....	....	22	8	4	1	4	5	....	....	22
Ankle joint	1	1	....	....	2	....	....	1	1	....	....	....	....	....	....	2	2	....	....	....	....	....	....	2
Foot, flesh	40	16	5	....	61	22	4	6	23	6	....	....	....	....	....	61	53	....	....	4	3	....	1	61
Tarsus and metatarsus, fracture	8	4	1	....	13	3	3	1	6	....	....	....	....	....	....	13	11	1	....	....	1	....	....	13
Toes, fracture	1	5	....	....	6	....	....	....	6	....	....	....	....	....	....	6	5	....	....	....	1	....	....	6
Unknown	3	2	....	....	5	1	....	....	4	....	....	....	....	....	....	5	4	....	1	....	....	....	....	5
Total	1,047	179	33	1	1,260	472	255	25	452	34	5	2	1	10	4	1,260	919	51	90	116	77	1	[1]6	1,260

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[1] On December 31, 1899, there remained on sick report 66 cases, but since that date 49 cases have been returned to duty, 9 discharged on account of disability, and 2 have ended fatally. The deaths include 1 case of fracture of the middle third of the femur and 1 of the 11 fatal cases of fracture of the cranium.

III.—VOLUNTEER ARMY, 1899.

(b) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.									Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Shrapnel.	Splinters.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Death, other causes.	Remaining last report.	Total.
Head:																	
Flesh	16	3	....	25	....	......	1	2	47	43	......	......	2	2	......	......	47
Fracture	8	3	....	4	....	......	......	......	15	2	1	8	2	1	......	1	15
Face:																	
Flesh	11	3	....	13	1	......	......	1	29	23	1	......	4	1	......	......	29
Fracture	9	3	....	4	....	......	......	......	16	4	3	......	5	4	......	......	16
Neck	18	8	....	9	....	......	......	......	35	24	......	8	2	1	......	......	35
Spine, fracture	1	1	....	1	....	......	......	......	3	......	1	1	......	1	......	......	3
Thorax:																	
Nonpenetrating	10	12	....	15	....	......	......	1	38	31	......	1	3	3	......	......	38
Penetrating	33	17	....	11	....	......	......	......	61	24	5	20	10	2	......	......	61
Abdomen:																	
Nonpenetrating	8	4	....	12	....	......	......	......	24	24	......	......	......	......	......	......	24
Penetrating	18	5	....	8	....	......	......	......	31	6	......	21	......	3	......	1	31
Pelvis, fracture	......	......	....	1	....	......	......	......	1	......	......	1	......	......	......	......	1
Back and hip, flesh	23	14	....	12	....	......	......	......	49	38	2	......	7	1	1	......	49
Perineum, genital and urinary organs	......	3	....	4	....	......	......	......	7	3	......	3	......	1	......	......	7
Shoulder:																	
Flesh	29	16	....	21	....	1	......	1	68	53	2	1	8	4	......	......	68
Fracture, clavicle and scapula	......	1	....	2	....	......	......	......	3	2	......	......	1	......	......	......	3
Joint	......	2	....	1	....	......	......	......	3	......	1	1	......	1	......	......	3
Arm:																	
Flesh	38	12	....	26	....	......	......	......	76	64	......	......	9	3	......	......	76
Fracture	5	8	....	1	....	......	......	......	14	4	1	3	4	2	......	......	14
Elbow joint	1	1	....	......	....	......	......	......	2	......	1	......	1	......	......	......	2
Forearm:																	
Flesh	27	12	....	22	....	......	......	1	62	56	2	......	4	......	......	......	62
Fracture	4	9	....	4	....	1	......	......	18	11	2	......	3	2	......	......	18
Hand, flesh	21	9	1	27	....	......	......	2	60	55	1	......	2	2	......	......	60
Carpus and metacarpus, fracture	1	......	....	2	....	......	......	......	3	3	......	......	......	......	......	......	3
Fingers, fracture	......	2	....	1	....	......	......	......	3	2	1	......	......	......	......	......	3

Thigh:																		
Flesh	79	61	1	47	1				189	150	6	2	17	13		1	189
Fracture, upper third	8	4							12	3		2	5	2			12
Fracture, middle third	6			1					7	2		[1]1	2	1		1	7
Fracture, lower third	2								2		1		1				2
Kneejoint	7	4		4					15	5	3		4	3			15
Leg:																		
Flesh	40	14		27					81	70	2	1	4	4			81
Fracture	7	11		1	1				20	6	4	1	4	5			20
Ankle joint				1					1	1							1
Foot, flesh	21	4		15					40	36			2	2			40
Tarsus and metatarsus, fracture	3	3		2					8	7	1						8
Toes, fracture				1					1	1							1
Unknown	1			2					3	3							3
Total	455	249	2	327	3	2	1	8	1,047	756	41	75	106	64	1	[1]4	[1]1,047

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[1] On December 31, 1899, there remained on sick report 46 cases; but since that date 35 cases have been returned to duty, 5 discharged on account of disability, and 2 have died. The fatal cases comprise 1 case of fracture of the middle third of the femur and 1 of the 8 fatal fractures of the cranium.

III.—VOLUNTEER ARMY, 1899.

(*c*) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.				Nature of missile.									Disposition.						
	In line of duty.	Not in line of duty.	Suicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shell.	Explosion of cartridge.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Remaining last report.	Total.
Head:																				
Flesh	2	1	....	3	......	....	......	2	1	....	....	....	3	3	......	......	......	......	......	3
Fracture	2	......	1	3	......	....	......	3	....	....	....	....	3	......	......	3	......	......	......	3
Face:																				
Flesh	2	......	....	2	......	1	......	......	....	....	1	....	2	1	1	......	......	......	......	2
Neck	5	......	....	5	......	....	1	3	1	....	....	....	5	3	......	1	......	1	......	5
Thorax:																				
Nonpenetrating	11	1	....	12	1	....	1	8	1	....	1	....	12	11	......	......	......	......	1	12
Penetrating	5	1	....	6	......	....	......	6	....	....	....	....	6	2	......	3	......	1	......	6
Abdomen:																				
Nonpenetrating	3	2	....	5	1	....	......	2	2	....	....	....	5	5	......	......	......	......	......	5
Penetrating	5	1	....	6	......	....	......	3	3	....	....	....	6	......	......	6	......	......	......	6
Back and hip, flesh	2	......	....	2	1	....	......	......	1	....	....	....	2	1	......	......	1	......	......	2
Shoulder:																				
Flesh	6	......	....	6	2	1	1	2	....	....	....	....	6	5	......	......	......	1	......	6
Arm:																				
Flesh	6	1	....	7	4	....	......	2	1	....	....	....	7	7	......	......	......	......	......	7
Fracture	1	......	....	1	......	....	......	......	1	....	....	....	1	......	1	......	......	......	......	1
Elbow joint	1	......	....	1	......	....	......	1	....	....	....	....	1	......	......	......	......	1	......	1
Forearm:																				
Flesh	5	......	....	5	1	1	......	2	1	....	....	....	5	5	......	......	......	......	......	5
Fracture	3	......	....	3	......	....	......	3	....	....	....	....	3	2	1	......	......	......	......	3
Wrist joint	1	......	....	1	......	....	......	1	....	....	....	....	1	1	......	......	......	......	......	1
Hand, flesh	26	5	....	31	......	....	2	21	4	....	2	2	31	31	......	......	......	......	......	31
Carpus and metacarpus, fracture	3	......	....	3	......	....	1	1	1	....	....	....	3	2	1	......	......	......	......	3
Fingers, fracture	26	3	....	29	1	....	6	18	4	....	....	....	29	20	5	......	4	......	......	29
Thigh:																				
Flesh	16	6	....	22	......	3	1	12	5	1	....	....	22	16	1	1	2	2	......	22
Fracture, middle third	......	1	....	1	......	....	......	1	....	....	....	....	1	......	......	......	......	1	......	1

Kneejoint	1	......	....	1	......	....	......	1	....	....	....	....	1	1	......	......	......	......	......	1
Leg:																				
Flesh	18	4	....	22	5	....	1	13	2	1	....	....	22	18	......	......	1	3	......	22
Fracture	1	1	....	2	......	....	1	1	....	....	....	....	2	2	......	......	......	......	......	2
Ankle joint	1	......	....	1	......	....	1	......	....	....	....	....	1	1	......	......	......	......	......	1
Foot, flesh	16	5	....	21	1	....	6	8	6	....	....	....	21	17	......	......	2	1	1	21
Tarsus and metatarsus, fracture	4	1	....	5	......	....	1	4	....	....	....	....	5	4	......	......	......	1	......	5
Toes, fracture	5	......	....	5	......	....	......	5	....	....	....	....	5	4	......	......	......	1	......	5
Unknown	2	......	....	2	......	....	......	2	....	....	....	....	2	1	......	1	......	......	......	2
Total	179	33	1	213	17	6	23	125	34	2	4	2	213	163	10	15	10	13	[1] 2	213

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[1] On December 31, 1899, there remained on sick report 20 cases, but since that date 14 cases have been returned to duty and 4 discharged on certificates of disability.

IV.—GUNSHOT WOUNDS WHICH TERMINATED FATALLY.

(*a*) *Regular and Volunteer armies, 1899.*

Character and location of wound.	How received.						Nature of missile.									
		Not in action.					In action.						Not in action.			
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Canister.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.
Head, fracture	10	2	....	1	1	14	5	3	....	2	...	...	...	....	3	1
Face, fracture	2	....	....	...	...	2	1	1	....	....	...	...	...	....	....	...
Neck	9	2	1	...	...	12	6	....	....	3	...	...	...	2	1	...
Spine, fracture	5	1	2	...	...	8	1	2	1	1	...	...	...	....	3	...
Thorax:																
Nonpenetrating	1	....	....	...	...	[1]1	1	....	....	....	...	...	...	....	....	...
Penetrating	28	5	1	1	1	36	10	12	....	6	...	...	...	1	5	2
Abdomen, penetrating	31	7	2	...	1	41	19	6	....	6	...	...	1	1	3	5
Pelvis, fracture	2	....	....	...	...	2	....	....	....	2	...	...	...	....	....	...
Perineum, genital and urinary organs	3	....	....	...	...	3	....	2	....	1	...	...	...	....	....	...
Shoulder:																
Flesh	1	....	....	...	...	[2]1	....	1	....	....	...	...	...	....	....	...
Joint	1	....	....	...	...	1	....	1	....	....	...	...	...	....	....	...
Arm:																
Flesh	1	....	....	...	...	[3]1	1	....	....	....	...	...	...	....	....	...
Fracture	3	....	....	...	...	[4]3	2	....	....	1	...	...	...	....	....	...
Forearm, flesh	....	1	....	...	...	[5]1	....	....	....	....	...	...	...	1	....	...
Carpus and metacarpus, fracture	....	....	1	...	...	[6]1	....	....	....	....	...	...	...	1	....	...
Thigh:																
Flesh	6	1	....	...	...	[7]7	2	3	....	1	...	...	...	....	1	...
Fracture, upper third	3	....	....	...	...	3	3	....	....	....	...	...	...	....	....	...
Fracture, middle third	1	....	....	...	...	1	....	....	....	....	...	1	...	....	....	...
Leg:																
Flesh	1	....	....	...	...	[8]1	1	....	....	....	...	...	...	....	....	...
Fracture	5	....	....	...	...	[9]5	1	3	....	....	1	...	...	....	....	...
Foot, flesh	....	1	....	...	...	[10]1	....	....	....	....	...	...	...	....	1	...
Unknown	....	1	....	...	...	1	....	....	....	....	...	...	...	....	1	...
Total	113	21	7	2	3	146	53	34	1	23	1	1	1	6	18	8

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[1] Died after an operation for traumatic aneurism.

[2] Hemorrhage from axillary artery.

[3] Died after an amputation at shoulder for injury to blood vessels.

[4] Septicæmia in 1 case; hemorrhage in 2 cases.

[5] Tetanus.

[6] Death after amputation at the shoulder joint for gangrene.

[7] Septic infection in 1 case; gangrene in 1 case; hemorrhage in 2 cases; not stated in 3 cases.

[8] Shock after operation on posterior tibial artery.

[9] Septic infection in 2 cases; tetanus in 1 case; immediate cause of death not stated in 2 cases.

[10] Tetanus.

IV.—GUNSHOT WOUNDS WHICH TERMINATED FATALLY.

(*b*) *Regular Army, 1899.*

Character and location of wound.	How received.						Nature of missile.									
		Not in action.					In action.						Not in action.			
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Canister.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.
Head, fracture	3				1	4	1	2								1
Face, fracture	2					2	1	1								
Neck	1	1	1			3	1							1	1	
Spine, fracture	4	1	2			7	1	2	1						3	
Thorax, penetrating	8	3		1	1	13	3	5						1	2	2
Abdomen, penetrating	10	2	1		1	14	7	3					1	1		2
Pelvis, fracture	1					1				1						
Arm, flesh	1					1	1									
Forearm, flesh		1				1								1		
Carpus and metacarpus, fracture			1			1								1		
Thigh:																
Flesh	4					4	1	3								
Fracture, upper third	1					1	1									
Fracture, middle third	1					1						1				
Leg, fracture	4					4	1	2			1					
Foot, flesh		1				1									1	
Total	40	9	5	1	3	58	18	18	1	1	1	1	1	5	7	5

(*c*) *Volunteer Army, 1899.*

Character and location of wound.	How received.					Nature of missile.					
		Not in action.				In action.			Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Total.	Mauser.	Remington.	Bullets, other.	Krag-Jörgensen.	Bullets, other.	Revolver.
Head, fracture	7	2		1	10	4	1	2		3	
Neck	8	1			9	5		3	1		
Spine, fracture	1				1			1			
Thorax:											
Nonpenetrating	1				1	1					
Penetrating	20	2	1		23	7	7	6		3	
Abdomen, penetrating	21	5	1		27	12	3	6		3	3
Pelvis, fracture	1				1			1			
Perineum, genital, and urinary organs	3				3		2	1			
Shoulder:											
Flesh	1				1		1				
Joint	1				1		1				
Arm, fracture	3				3	2		1			
Thigh:											
Flesh	2	1			3	1		1		1	
Fracture, upper third	2				2	2					
Leg:											
Flesh	1				1	1					
Fracture	1				1		1				
Unknown		1			1					1	
Total	73	12	2	1	88	35	16	22	1	11	3

V.—SURGICAL OPERATIONS FOR GUNSHOT WOUNDS.

Regulars and volunteers, 1899.

Character and location of wound.	Operation.	Result.		Nature of missile.								
		Recovered.	Died.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Canister.	Explosion of cartridge.
Head, fracture	Bone removed from brain		1	1								
Do	Depressed portion of skull removed	1			1							
Do	Eye enucleated	1		1								
Do	Wound closed by sutures	1								1		
Face, flesh	Enucleation of eye	1										1
Face, fracture	do	1		1								
Do	Bullet removed through floor of mouth	1			1							
Do	Fragments of bone and portion of bullet removed.		1	1								
Neck	Bullet removed	2		1	1							
Spine, fracture	do	1	1	1	1							
Do	Laminectomy for extraction of bullet		1				1					
Thorax, nonpenetrating.	Operation for aneurism of axillary		1	1								
Do	Subclavian artery ligated for aneurism	1			1							
Thorax, penetrating.	Ligation axillary artery	1					1					
Do	Bullet removed	6	1		7							
Do	Resection seventh rib		1					1				
Abdomen, penetrating.	Bullet removed		2	1	1							
Do	Bullet located by X-ray in left iliac fossa.	1		1								
Do	Laparotomy	1	4	4	1							
Perineum, genital and urinary organs.	Bladder sutured		1				1					
Shoulder, fracture clavicle or scapula.	Fragment of bullet removed	1					1					
Shoulder joint	Bullet removed	1			1							
Arm, flesh	Amputation at shoulder		1	1								
Arm, fracture	Amputation	2	1	2		1						
Do	Amputation at shoulder		1	1								
Do	Bullet removed	1		1								
Do	Bullet and fragments of bone removed	1		1								
Do	Bullet removed and humerus resected	1			1							
Do	Numerous small fragments removed through incision.	1		1								
Elbow joint	Bullet extracted and fragments wired	1			1							
Forearm, fracture	Amputation	2					2					
Do	Bullet removed	2			2							
Do	Pieces of bone removed	2					2					
Carpus and metacarpus, fracture.	Bullet removed	2					1	1				
Do	Amputation of fingers	3		1	1		1					
Do	Amputation, finger and distal two-thirds of third metacarpal.	1					1					
Do	Amputation, finger and resection second metacarpal.	1					1					
Do	Excision third and fourth metacarpal	1			1							
Do	Amputation at shoulder for gangrene		1			1						
Do	Operation for necrosed bone	1					1					
Fingers, fracture	Amputation	54		1	1	18	27	6	1			
Hip joint	Pieces of bone removed	1			1							
Thigh, flesh[1]	Bullet discovered by X-ray and removed.	1			1							
Do	Ligation of femoral artery	1	1	1	1							
Do	Amputation of leg[2]	1			1							
Do	Amputation thigh for gangrene	1		1								
Thigh, fracture, upper third.	Bullet removed	3			3							
Thigh, fracture, middle third.	do	1		1								
Do	Amputation		1				1					
Do	Resection		1								1	
Do	Fractured ends denuded of necrotic material and coapted; pus sinuses curetted.	1					1					

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[1] Ligation of the external iliac artery was performed in 1900 in the case of a flesh wound of the thigh received in 1899; gangrene subsequently necessitated a disarticulation at the hip joint, which was successful. See page 327.

[2] For gangrene resulting from injury to popliteal artery.

V.—SURGICAL OPERATIONS FOR GUNSHOT WOUNDS—Continued.

Regulars and volunteers, 1899—Continued.

Character and location of wound.	Operation.	Result.		Nature of missile.								
		Recovered.	Died.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Canister.	Explosion of cartridge.
Thigh, fracture, lower third.	Bullet removed	1		1								
Do	Sinuses curetted and dead bone removed.[1]			1								
Knee joint	Bullet removed	4		1	2		1					
Do	Amputation of thigh.	1					1					
Leg, flesh	Resection of external popliteal nerve	1		1								
Do	Bullet discovered by X-ray and removed.	1			1							
Do	Operation for severed tibial artery		1	1								
Leg, fracture	Bullet removed	1						1				
Do	Scales of lead removed	1		1								
Do	Bullet and spiculæ of bone removed	1				1						
Do	Trephining of bone; removal of bullet and necrosed parts.	1					1					
Do	Splinters of bone removed	1		1								
Do	Operation for comminuted fracture tibia. Ends of tibia freshened and periosteum of opposing segments sutured.	1				1						
Do	Removal of detached bone fragments; plaster of paris splint with drainage through posterior exit.	1		1								
Do	Amputation	4			2	1	1					
Ankle joint	Bullet removed	1					1					
Foot, flesh	Carious bone curetted[2]					1						
Do	Operation for necrosis	1				1						
Tarsus and metatarsus, fracture.	Amputation	2				1	1					
Do	Bullet and fragment of bone removed.	1					1					
Do	Bullet discovered by X-ray and removed.	1		1								
Do	Splinters of bone removed.	1				1						
Do	Numerous fragments of bone removed[1].					1						
Do	Necrosed spiculæ of bone removed.	1				1						
Toes, fracture	Amputation	4		1			3					

[1] Remaining August 31, 1900.

[2] Remaining July 31, 1900.

General remarks on the gunshot wounds of 1898 and 1899.—Of the 4,919 men injured by gunshot during the years 1898 and 1899, 586 were killed and 4,333 were wounded and received into the field and other hospitals. The killed constituted 11.9 per cent of those struck, the wounded 88.1 per cent. In other words, 1 man was killed for every 7.4 wounded. The Mauser bullet must therefore be regarded as less deadly than the larger missile used during the civil war. The Medical and Surgical History of the Civil War shows the following casualties:

	Killed.	Wounded.
United States troops	59,860	280,040
Confederate troops	51,425	227,871
Total	111,285	507,911

In percentages the casualties were: Killed, 17.97; wounded, 82.03; or 1 man killed to every 4.56 wounded. The relative proportion of killed was therefore consideraly larger during the civil war than during our recent experiences. It is to be noted, also, that many of the wounds of the past two years were made by missiles of large caliber. Of those reported in 1899, 471 were specially stated as having been caused by the Remington bullet of caliber .45. It is safe to say that had the whole number of wounds received been inflicted by the smaller Mauser or Krag-Jörgensen bullet the percentage of immediately fatal wounds would have been materially lessened.

The less deadly character of the injuries inflicted by the modern bullet is manifested, also, when we exclude the killed and regard only those wounds which came under the care of the surgeons. Of these, during the two years, there were 4,333, and 259 of the patients, or 6 per cent of the whole number, died. The corresponding percentage from the records of the civil war was 14.3. Table C in Part I of the medical volume of the Medical and Surgical History of the War of the Rebellion shows that among the white troops of the Army there were borne on the reports of sick and wounded 230,018 gunshot wounds, of which 32,907, or 14.3 per cent, proved fatal. The marked reduction of the ratio of killed to wounded may be placed to the credit of the small-caliber bullet; but the lessened mortality among the cases which came into hospital may not wholly be attributed to the humane character of the wounds inflicted by this missile. Due credit must be given to the improved surgical methods of the present day. Wounds of any region of the body may be taken in comparison and the result will always be found to show a decided lessening in the percentage of cases ending fatally among those of the past two years as compared with those of the civil war. Take, for instance, gunshot wounds of the femur. During the civil war surgeons in the field hospitals regarded a fractured femur as a serious menace to life, the danger from which was believed to be materially lessened by an immediate amputation. The field hospital surgical work after a battle consisted in great part of amputations, excisions, and resections. Of 6,576 fractures of the femur 2,923 cases were treated by primary amputation, 186 by resection, and the remaining 3,467 by conservative or expectant measures, this conservative action being due in many of the cases to a want of favorable conditions for the performance of primary operations. The limb was promptly amputated in 44.4 per cent of these gunshot fractures. On the other hand, during the past two years, 82 cases of gunshot fracture of the femur were reported, 6 of which were treated by primary amputation and 2 by resection, the remaining 74 cases being treated by conservative methods, not because the conditions were not favorable for the performance of primary operations, but because of a conviction that under present methods of treatment the limb could be preserved without adding materially to the danger to life. The limb was lost through surgical intervention in only 7.3 per cent of the cases.

Not only limbs but lives were saved by the surgical practice of the past two years. In the 82 gunshot fractures of the femur the upper third was involved in 32, of which 5 were fatal; the middle third in 27, of which 3 were fatal; and the lower third in 23, of which 1 was fatal. The mortality varied from 4.3 per cent of the cases in which the lower third was fractured to 15.6 per cent of the cases in which the upper third was the site of the injury, whereas the corresponding percentages of fatal cases during the civil war were, respectively, 42.8 and 49.7. The whole of the lessened mortality in these serious fractures may be credited to the protection given to the wound by the first-aid dressing and to the care exercised in the subsequent aseptic treatment of the fractured limb.

In penetrating wounds of the thorax the rate of mortality fell from 62.6 per cent during the civil war to 27.8 per cent during the years 1898 and 1899. The civil-war reports show 8,403 cases in which the results were determined; 5,260 deaths occurred among the number. The reports for the later years, as already stated, show 198 cases, of which only 55 were fatal.

There were during the civil war 3,475 penetrating wounds of the abdomen in which the ultimate results were determined; 3,031 of these, or 87.2 per cent of the total, proved fatal. During the years 1898 and 1899 116 cases—81 fatal—were recorded, the fatal cases constituting 70 per cent of the total. Of 10 cases in which laparotomy was performed, 9 were fatal.

The alteration in the percentages of mortality in fractures of the cranium is less marked than in wounds of other parts of the body. Of 4,243 cases of cranial fracture during the civil war 2,514, or 59.2 per cent, were fatal. In 1898 and 1899 68 cases were recorded, with 37 deaths, the latter forming 54.4 per cent of the whole number.

SUICIDES AND HOMICIDES.

The following tabulations present the details of the cases of suicide and homicide which were reported during the years 1898 and 1899. The ratios of suicides per thousand of strength—0.26 in the former and 0.28 in the latter year—and that of homicides—0.13 and 0.22, respectively—are all lower than the mean annual ratios of the ten years 1888–1897:

1898.

Commands.	Mean strength.	Suicides.									Homicides.			
		Poison, narcotic.	Poison, irritant.	Hanging.	Drowning.	Incised wound.	Gunshot.	Suffocation.	Total.	Ratio per thousand of strength.	Incised wound.	Gunshot.	Total.	Ratio per thousand of strength.
Cuba:														
Regulars	3,810	....	....	....	2	....	1	....	3	0.79	....	....	....	......
Volunteers	4,535	....	....	....	....	....	1	....	1	.22	....	....	....	......
Total	8,345	....	....	....	2	....	2	....	4	.48	....	....	....	......
Porto Rico:														
Regulars	1,930	....	....	....	....	....	1	....	1	.52	....	....	....	......
Volunteers	3,763	....	1	....	....	....	....	....	1	.27	....	1	1	0.27
Total	5,693	....	1	....	....	....	1	....	2	.35	....	1	1	.18
Pacific Islands:														
Regulars	2,903	1	....	....	....	....	....	....	1	.34	....	1	1	.34
Volunteers	7,004	....	1	....	....	1	....	....	2	.29	....	1	1	.14
Total	9,907	1	1	....	....	1	....	....	3	.30	....	2	2	.20
United States:														
Regulars	37,992	2	....	2	1	1	11	1	18	.47	....	4	4	.11
Volunteers	85,269	....	1	....	....	2	8	....	11	.13	1	11	12	.14
Total	123,261	2	1	2	1	3	19	1	29	.24	1	15	16	.13
United States armies:														
Regulars	46,635	3	....	2	3	1	13	1	23	.49	....	5	5	.11
Volunteers	101,160	....	3	....	....	3	9	....	15	.15	1	13	14	.14
Total	147,795	3	3	2	3	4	22	1	38	.26	1	18	19	.13

1899.

Commands.	Mean strength.	Suicides.								Homicides.				
		Poison, narcotic.	Poison, irritant.	Drowning.	Incised wounds.	Gunshot.	Other injuries.	Total.	Ratio per thousand of strength.	Incised wounds.	Gunshot.	Other injuries.	Total.	Ratio per thousand of strength.
Cuba:														
Regulars	11,969	1	1	....	2	3	....	7	0.58	....	3	1	4	0.33
Volunteers	8,082	....	....	....	....	....	....	....	......	....	....	....	....	......
Total	20,051	1	1	....	2	3	....	7	.35	....	3	1	4	.20
Porto Rico:														
Regulars	3,347	....	....	....	....	1	1	2	.60	1	....	....	1	.30
Volunteers	380	....	....	....	....	....	....	....	......	....	....	....	....	......
Total	3,727	....	....	....	....	1	1	2	.54	1	....	....	1	.27
Pacific Islands:														
Regulars	22,922	1	....	1	2	5	1	10	.44	2	7	1	10	.44
Volunteers	16,358	....	....	....	....	5	....	5	.31	1	....	1	2	.12
Total	39,280	1	....	1	2	10	1	15	.38	3	7	2	12	.31
United States:														
Regulars	26,208	1	....	1	....	2	....	4	.15	....	5	....	5	.19
Volunteers	15,984	....	1	....	....	1	....	2	.13	....	1	....	1	.06
Total	42,192	1	1	1	....	3	....	6	.14	....	6	....	6	.14
United States armies:														
Regulars	64,446	3	1	2	4	11	2	23	.36	3	15	2	20	.31
Volunteers	41,100	....	1	....	....	6	....	7	.17	1	1	1	3	.07
Total	105,546	3	2	2	4	17	2	30	.28	4	16	3	23	.22

Decade 1888–1897 compared with 1898 and 1899.

Year.	Mean strength.	Suicides.		Homicides.	
		Number.	Ratio per thousand.	Number.	Ratio per thousand.
1888	26,739	8	0.30	5	0.19
1889	27,206	21	.77	5	.18
1890	26,684	16	.60	7	.26
1891	26,460	22	.83	8	.30
1892	26,861	22	.82	5	.19
1893	27,659	22	.80	5	.18
1894	27,674	18	.65	10	.36
1895	27,326	19	.70	1	.04
1896	27,183	12	.44	4	.15
1897	27,374	10	.37	5	.18
Mean	27,116.6	17	.63	5.5	.20
1898	147,795	38	.26	19	.13
1899	105,546	30	.28	3	.22

SPECIAL SURGICAL REPORTS.

The following list comprises the reports on surgical subjects rendered during the fiscal year ended June 30, 1900:

Name.	Rank.	Reports.
Ames, E. W	Acting assistant surgeon	History of radiographs. Report of work as pathologist in U. S. A. general hospital, Presidio, San Francisco, Cal.
Anderson, C. T. G	do	Gunshot wound, left leg.
Arthur, Wm. H	Major and surgeon	Report of surgical operations on hospital ship Missouri.
Baird, W. T	Acting assistant surgeon	Hernia. Chronic ulcer of penis.
Banister, J. M	Major and surgeon	Operation for radical cure of hernia; 4 cases.
Bevans, James L	Acting assistant surgeon	Incised wound of throat; suicide.
Borden, W. C	Captain and assistant surgeon.	Gunshot wounds observed during Spanish-American war.
Boyer, Arthur I	Acting assistant surgeon	Fracture of head of femur.
Bradley, A. E	Captain and assistant surgeon.	Appendicitis, 2 cases. Operation for radical cure of hernia.
Bratton, T. S	do	Incised wounds, arm, neck, and back.
Carling, John	Acting assistant surgeon	Report of an engagement at Iba, P. I.
Cloud, M. M	First lieutenant and assistant surgeon.	Foreign body in intestines; safety pin. Gunshot wound of chest.
Duval, Douglas F	do	Amputation of legs. Operation for radical cure of hernia.
Ebert, R. G	Major and surgeon	Operation for radical cure of hernia.
Fitzgerald, R. J	Major and surgeon, volunteers.	Report of cases occurring in First Reserve hospital, Manila, P. I.
Flagg, C. E. B	Captain and assistant surgeon.	Report of surgical operations year ending June 30, 1900.
Ford, J. H	First lieutenant and assistant surgeon.	Surgical operations Second Reserve hospital, Manila, P. I.: (1) Appendicitis; (2) nephrolithiasis.
Girard, A. C	Major and surgeon	Gunshot wound of brain, 2 cases. Operation for radical cure of hernia, 19 cases. Report of surgical operations, 59 cases. Report of surgical operations, February, 1900.
Godfrey, Guy C. M	Captain and assistant surgeon.	Method of controlling arterial hemorrhages. Report of surgical operations, December, 1899. Multiple abscess. Report of surgical operations, January, 1900. Surgical operations, February, 1900. Surgical operations, March, 1900. Surgical operations, April, 1900.
Haines, A. C	Captain and assistant surgeon, volunteers.	Report of surgical operations at Davao, P. I.
Harvey, P. F	Major and surgeon	Gunshot wound of chest.
Howard, D. C	Captain and assistant surgeon.	Tubercular arthritis, resection.
Jackson, T. W	Acting assistant surgeon	Traumatic meningitis, epilepsy. Incised wounds of neck.
Kennedy, James S	do	Gunshot wound of chest. Fracture of skull, trephining.
Kilbourne, H. S	Major and surgeon	Dislocation of left hip.
Matthews, W. S. H	Major and surgeon, volunteers.	Gunshot wound of back.
Maus, L. M	Major and surgeon	Operation for radical cure of hernia.
McMillen, M. B	Acting assistant surgeon	Gunshot wound of head.
Moseley, E. B	Major and surgeon	Gunshot fracture, left leg.
Penrose, George	Major and surgeon, volunteers.	Gunshot wound of head.
Pillow, Robert	Acting assistant surgeon	Appendicitis.
Rebert, M. A	do	Tumor, right breast, sarcoma.
Shellenberger, J. E	Major and surgeon, volunteers.	Multiple wounds.
Shimer, Ira A	First lieutenant and assistant surgeon.	Operation for radical cure of hernia, 3 cases. Traumatic epilepsy.
Skinner, George A	do	Appendicitis. Osteomyelitis.
Stark, A. N	Captain and assistant surgeon.	Surgical operations since January, 1900. Report of surgical operations: (1) Acute grangrenous appendicitis; (2) operation for disease of mastoid; (3) fracture of patella; (4) hypodermatic administration of quinine in the malaria of the Tropics.
Stone, J. H	First lieutenant and assistant surgeon.	Cœliotomy, with appendectomy and unilateral ovariotomy.
Welch, D. W	do	Gunshot wound of ankle.
Wertenbaker, C. I	Acting assistant surgeon	Gunshot wound of head. Gunshot wound of face. Gunshot wound of chest.
Willcox, Charles	Captain and assistant surgeon.	Abdominal abscess. Operation for radical cure of hernia. Report of three surgical operations: (1) Radical cure, encysted hydrocele cord, and varicocele; (2) removal of toes to correct deformity; (3) ligation of transverse facial artery.
Wilson, N. W	Acting assistant surgeon	Gunshot wound of head; suicide.
Woodruff, C. E.	Captain and assistant surgeon.	Gunshot wounds, Krag-Jörgensen rifle, 2 cases.

Notwithstanding the utmost care exercised in operative surgery in the field, aseptic results, as might be expected, are not always obtained. To illustrate this, Capt. Charles E. B. Flagg, assistant surgeon, United States Army, reported the cases of two men of the Seventeenth Infantry wounded at Masapinit November 10, 1899. One was brought into the regimental hospital with a gunshot wound of the right thorax and abdomen. An incision as for right lumbar nephrectomy was made, and the liver and intestines were explored and found to be uninjured. Drainage was instituted, as the wound passed through the diaphragm and lung. The other was received immediately afterwards, with a first-aid dressing on his wounds. The aperture of entrance was just above the crest of the left ilium, the bullet (Mauser) passing upward and to the right, fracturing the spinous processes of the two upper lumbar vertebræ, but inflicting no injury on the spinal cord, as shown by absence of symptoms and by an exploratory incision. The bullet was taken from the lumbar muscles on the right. Both cases received their first dressing on arriving at Angeles on November 13. The first case was retained at this place and speedily recovered. The second was sent to the First Reserve hospital at Manila, where death occurred from septic fever November 22. The history of the latter case does not show when the infection took place; but in both cases the operative treatment at the regimental hospital was conducted with the same precautionary measures. No one but the operator and his assistant came in contact directly or indirectly with the wounds, and all instruments and dressings were carefully sterilized.

As illustrations of the military surgery of the medical department of the army in the Philippines, I here submit a report of the surgical work in the First Reserve hospital, Manila, P. I., together with reports of gunshot and bolo wounds, taken chiefly from the records of the hospital ship *Relief*.

REPORT OF THE OPERATIVE WORK AT THE FIRST RESERVE HOSPITAL, MANILA, P. I., FROM SEPTEMBER 1, 1899, TO FEBRUARY 28, 1900, BY MAJ. W. P. KENDALL, SURGEON, UNITED STATES ARMY, CHIEF OPERATOR.

Because of the large amount of work and limited assistance, this report is not complete, though it includes all important operations, with details of the most interesting. No attempt has been made to give a complete history of the cases during treatment, the final result alone being noted. With from 150 to 200 beds always filled and rapidly changing, the work alone was more than could be perfectly cared for, and histories dropped into the background.

During the first five months, and before base hospitals had been established at various points in the island, most of the larger surgical work was sent back from the line to the First Reserve hospital, which fact accounts for the large amount of work done. This was also true of the period antedating the beginning of this report, and with which it is in no way connected.

The work of Acting Asst. Surg. Ernest Robinson, United States Army, my assistant and colaborer, has merited the highest praise. His unerring judgment, great experience, and splendid technique were constant causes for remark and admiration. To him much is due for the, it is believed, excellent quality of work done during this period.

Hernia.—During the period mentioned there were performed 49 operations for the radical cure of hernia. These included 2 umbilical, 2 ventral, in old cicatrices following operations for appendicitis, and 1 femoral; the rest were inguinal of different types. The Bassini was the method generally adopted, while kangaroo tendon for the deepest layers, catgut for the second, and interrupted silkworm gut for the integument were the materials usually employed for suturing. These were sometimes interrupted, sometimes continuous. Castration was resorted to in two or three cases of undescended testicle. At first some little trouble was experienced with the suture material. This entirely disappeared when all suture material was resterilized, and afterwards primary union was the invariable rule.

Because of the numerous complaints heard after the operation, the question of the advisability of performing it has arisen; but it is believed that those who complained would have complained more without it and that their troubles were mostly imaginary, while really good men were infinitely benefited by it. It is believed, however, hat no man should be enlisted with a hernia, however small, and the scar of an ppendicitis operation should positively bar a man from enlistment. This applies ven where there has been primary union. Most of the cases were returned to duty from four to six weeks after the operation, without a truss. One case of recurrence was observed.

Appendicitis.—There were operated upon for appendicitis 19 cases, by far the greater number having reached the abscess stage. That no uncomplicated case was lost was considered great good fortune. The appendix was removed in nearly every case, though there were a few exceptions, and in 2 of these there was a recurrence of the disease before the cases got from under observation. At the second operation the appendices were removed.

One case of chronic amœbic dysentery presented such a thickened condition in the right iliac region that an operation for appendicitis was performed, the real nature of the case not being discovered until the abdomen was opened. Such thickening of the intestinal coats I had never seen; these were friable to an extreme degree. To the casual reader this error may seem to have been unnecessary, but this case was one of the latest in a series where no error in diagnosis had been made, and no case was ever operated upon without consultation. It is reported in order to show what possibilities may arise. The case had been under observation for two months, and though a dysenteric condition was known to exist, the extent of it was not believed to be so great, and appendicitis was thought to have supervened. The tumor consisted of plastic material about the caput coli, the walls of which were enormously thickened and disorganized.

Perforation in typhoid.—One attempt to sew the perforations caused by a typhoid ulcer was made, a general anæsthetic being used; but though the intestinal wounds, two in number, looked well at post-mortem, the result was a failure. The patient lived thirty-six hours after the operation, and it was believed that had it been done some hours earlier the result might have been different.

Abscess of the liver.—There were three abscesses of the liver seen and operated upon. All gave a dysenteric history, and all were failures. To one unfamiliar with the extent to which the lesions of chronic amœbic dysentery go, this seems unnecessary, but to one who is familiar with the lesions the wonder is that any recover from intercurrent trouble. One case lived ten days, and then died of exhaustion. They were operated upon while under the influence of a general anæsthetic, the capsule and peritoneum having been united the day previous. A thermo cautery was used to open the abscess, and no hemorrhage of any moment was met with. One case was multiple, the others single.

As has been said, the pathological appearances presented by the colon at post-mortem precluded recovery from the dysentery alone.

Disarticulation at the hip, following ligation of the external iliac, traumatic aneurism.—W. C. R., first lieutenant, Thirty-sixth Infantry, United States Volunteers, was admitted December 30, 1899, suffering from a gunshot wound, Mauser, in the right Scarpa's triangle. The ball entered about 3 inches below Poupart's ligament and passed directly backward, appearing just below the gluteal fold; no fracture. The wound was received in action near Tarlac December 21, 1899.

At the time of admission the external wounds were still discharging slightly, and a pulsating tumor at the base of the triangle extended above Poupart's ligament. It was decided that the ligation of the main artery offered the only chance to save life, and accordingly, on January 3, 1900, the patient was anæsthetized and an incision 3 inches long was made just above Poupart's ligament and parallel with it. Separating the peritoneum from the pelvic wall the external iliac was easily reached, and a ligature of heavy silk thrown around it about 1½ inches above the ligament. The patient rallied well from ether, but the circulation was not reestablished, and four days later, a line of demarkation showing, it became necessary to amputate. Disarticulation at the hip joint was done by Wyeth's bloodless method; an unhealthly short anterior flap and a better and long posterior one was secured. The patient was greatly shocked, and venous injection of 3 pints of normal salt solution was resorted to besides strychnia and brandy hypodermatically. After hours of extreme collapse the patient slowly rallied, and but for a slight mental aberration, which appeared some two weeks later and continued for a week, made an uneventful recovery. The anterior flap, notwithstanding its badly infiltrated and discolored condition, did not break down, and the final result, the conditions considered, was perfect.

Gunshot wounds.—The experience with gunshot wounds confirms that of others, viz: That they are generally aseptic and show infection only when exposed after the receipt of the injury. Those which were flesh only, when carefully dressed, healed rapidly and without suppuration. The majority of wounds suppurated, but this was undoubtedly due to contamination upon the field, as frequently proven by the healing without suppuration in the carefully dressed cases. The use of the first-aid package carried by individuals proved of inestimable value.

Wounds complicated by bone and even joint injuries followed the above rule, and when kept pure healed with surprising rapidity and often with slight or no permanent injury, though destruction of tissue in some cases was considerable; in one or two instances the ball passed through the kneejoint, yet left no lasting disability or loss of motion.

As to the effect upon tissue which the small-sized modern rifle ball produces, it is not thought that the experience modifies accepted opinions, but rather confirms them. The openings of entrance and exit did not differ so much in appearance as one would expect, the rule being that the difference was apparent, though cases were not wanting in which it was impossible to tell in which direction the ball had traveled. In the majority of cases foreign material from the clothing was not carried by the missile into the tissues.

Time was wanting, though other opportunities offered, to make a careful study of the explosive effects of the small-caliber ball at different ranges. As a rule, however, wounds were received at comparatively short range and the explosive effect was present.

The 3 following cases owe their interest to the fact that they became infected with the bacillus aerogenes capsulatus prior to admission to the hospital, and they were the only cases so infected between the dates of September 1, 1899, and March 1, 1900.

In all 3 cases the exact condition was not detected upon admission, but rapid changes, both constitutional and local, soon made it apparent that we were not dealing with ordinary infection.

Case I.—A captain of the Thirty-sixth Infantry, United States Volunteers, was admitted to hospital about 7 o'clock in the evening with a flesh gunshot wound of the right leg in its middle portion. No fracture existed; the wound had been antiseptically dressed, it was supposed, in the field. The patient was suffering considerable pain, which was thought to be due alone to the extravasation in the muscles of the calf, the parts being considerably swollen, tense, and ecchymotic. An evaporating lotion was prescribed, and the patient was left for the night. He received one-half grain of morphine during the night. I was called early in the morning to see him because of the pain he was suffering. To my surprise the swelling which the night before did not extend above the lower border of the popliteal space had now reached Poupart's ligament, was fairly tense, ecchymotic, and crepitation existed everywhere beneath the integument, which, particularly from the lower third of the thigh downward, was covered with blebs containing a sero sanguinolent fluid, while bubbles appeared in the wound and a cadaveric odor was noticed. The pain was severe and the patient already in profound shock.

He was immediately taken to the operating room, where a consultation decided that a high amputation offered the only hope of saving life, and although the case was considered hopeless, an amputation at the middle of the thigh was done, but notwithstanding all possible stimulation the patient sank rapidly and died soon after leaving the table. The microscope revealed the presence of the bacillus aerogenes capsulatus.

Case II.—Private R. R., Company A, Thirty-seventh Infantry, United States Volunteers, was admitted January 24, 1900, suffering with a flesh gunshot wound of the lower third of the right thigh. No fracture; the wound had been dressed on the field three days before, and though it looked badly the condition was not diagnosed. After a thorough cleaning under ether a large rubber drainage tube was introduced, and the wound having been put up in a wet dressing, the patient was returned to the ward.

Next day he was profoundly shocked; the entire limb was badly swollen and ecchymotic; crepitation beneath the integument and exuding gas from the wound existed, together with the peculiar cadaveric odor. As extreme surgical interference was out of the question, several long incisions, laying open all the deep layers of fasciæ, were made over both thigh and leg; the patient was immediately placed in a continuous bath of the temperature of 104°, and all possible stimulation kept up, but he sank rapidly and died four hours later. Bacteriological examination revealed the presence of the bacillus aerogenes capsulatus.

Case III.—A. O'N., private, Company F, Thirty-ninth Infantry, United States Volunteers, was admitted on the same date as the previous case, January 24, 1900, having received at the same time, January 21, and place a flesh gunshot wound of the right buttock. Like the other, it was not considered dangerous, there being no fracture of any of the bones or injury to the vessels. The wound was cleansed, dressed antiseptically, and the patient returned to the ward. Next day nothing serious was suspected; a drainage tube having been introduced and the wound dressed, he was returned to bed. At this dressing a scarlatinous rash over the entire body was apparent. This had practically disappeared twenty-four hours later, but the conditions had now become suspicious. In a milder degree all conditions mentioned in the previous cases were apparent, and the feeble and rapid pulse indicated that we were dealing with our old enemy. The patient died some ten hours later. Microscopical examination confirmed the diagnosis, bacillus aerogenes capsulatus being present.

An extreme degree of shock, with all its accompanying symptoms, was a marked feature in all these cases.

Private F. T., regiment not given, was shot near Calamba, P. I., in action with the Filipino insurgents, the ball entering about one inch below the center of the left clavicle; no exit; no fracture of ribs. The immediate effect was shown by considerable shock and profuse hemorrhage, which was controlled by pressure. He reached the hospital about thirty-six hours after the receipt of the injury, anæmic from the hemorrhage and very weak, pressure still kept up. Upon removing the dressing the hemorrhage did not continue and the wound was dressed antiseptically. The patient steadily improved, no further hemorrhage occurred, and the wound healed. Some two weeks later a pulsating tumor about the size of a hen's egg was discovered in the outer portion of the subclavicular space.

As this was growing rapidly and already causing considerable pain in the arm, it was decided to tie the subclavian artery. The usual incision was made about three-fourths of an inch above the clavicle and parallel with it. Considerable difficulty was experienced in locating the artery, due to the absence of the normal conditions which the extravasation of blood into the neighboring tissues and subsequent inflammation had produced, and when found it was discovered that to get well above the tumor it was necessary to throw the ligature inside of the outer border of the scalenus anticus muscle, thus really tying in the second part of the artery.

No further trouble was experienced; the wound healed by first intention, and three weeks later the patient was sent to the United States. The temperature of the arm was restored in about forty-eight hours; sensation had been restored as far as the wrist when he left the hospital, but as yet the loss of the power of motion was complete.

The kneejoint was opened three times for recent fracture of the patella, the fragments wired, and primary union obtained with perfect motion in each case.

One case of tetanus occurred in the person of a native, with fatal result.

Erysipelas was not seen.

One cystic ovarian tumor, weight 40 pounds, was successfully removed.

The small number of venereal cases is accounted for by the fact that this was a distinct department and those operations were done at another point.

Anæsthetics.—Regarding the choice of anæsthetics there was an apparent difference, not seen in the United States, between ether and chloroform. Whether this would disappear after a longer experience and some modified way of administration or not was not determined; but, as it was, we all grew to be afraid of chloroform, including those whose experience with it had been large, even to the exclusion almost of ether. Heart failures came on rapidly and with great severity, producing death in two chronic appendicitis cases before the operation was begun. Besides these there were several cases of suspended animation, while with ether no trouble was observed.

Our experience fully confirms that of those who claim that in hot countries the paralyzing effect of chloroform is greater than when used in colder climates, due, probably, to the lack of tone of the motor nerves.

In the following table the various operations are classified and the results in each shown:

Operations.	Total.	Recovered.	Died.
Abscesses, large	52	51	1
Abscess of liver	3	....	3
Amputations	15	13	2
Amputation, hip joint for gunshot wound	2	1	1
Amputation of humerus	1	1	....
Amputation of thigh	4	3	1
Appendicitis	19	17	2
Carbuncle	3	1	2
Castration	2	2	....
Dislocations	2	2	....
Enucleation of the eye	3	3	....
Exostosis—1 humerus, 1 femur	2	2	....
Fistula in ano	12	12	....
Fractures, simple	19	19	....
Gunshot wounds:			
Flesh	142	139	3
With fractures	32	27	5
Hemorrhoids	35	35	....
Hernia, all varieties	49	49	....

Operations.	Total.	Recovered.	Died.
Hydrocele	7	7	....
Incised wounds, flesh	16	15	1
Ingrowing toe nail	6	6	....
Intracapsular fractures	2	2	....
Ischio-rectal abscess	7	7	....
Lacerated wounds	22	22	....
Ligations:			
External iliac, recovery after amputation at hip joint	1	1	....
Femoral artery	1	1	....
Subclavian artery, second part	1	1	....
Temporal artery	1	1	....
Ovariotomy	1	1	....
Salivary fistula	1	1	....
Simple fracture, patella, wired, recovery with perfect motion	3	3	....
Sprains	6	6	....
Tenotomy for strabismus	5	5	....
Tetanus	1	.....	1
Trephining, gunshot wound	1	.....	1
Urethrotomy:			
External	1	1	....
Internal	4	4	....
Varicocele, Bennet's operation	13	13	....
Benign tumors	7	7	....
Empyema, exsection of seventh and eighth ribs	3	2	1
Epithelioma, face	1	1	....
Exsection elbow joint	1	1	....
Mastoid, Schake Schwartz	1	1	....
Osteomyelitis	2	2	....

ABSTRACTS FROM THE RECORDS OF THE U. S. HOSPITAL SHIP RELIEF.

[Operations by Maj. H. O. Perley, surgeon, United States Army.]

Gunshot wound of face.—J. L., private, Company K, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital, First Battalion, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wound right side of face, one-half inch from nose, by small-caliber bullet. Bullet supposed to be lodged in head. Occurred in attack on insurrectos at La Paz, Leyte, P. I., April 26, 1900. Severe. Condition on admittance, good. Temperature, normal. Diagnosis made on *Relief:* Severe gunshot wound of face. Entrance, three-fourths inch below inner cathus, right eye. No exit. Slight purulent discharge; foul odor resembling ozena. X-ray examination showed faintly dark object deeply within tissues of head in plane in front of ears. Inspection and palpation showed slight bulging in front of left ear just below zygomatic process.

Operation May 1, 1900: Curvilinear incision 2 inches long, with concavity forward, made one-half inch in front of left ear. Dissection made down to bone. Bullet felt in left zygomatic fossa; body of bullet resting just below floor of left orbit in antrum of Highmore. Nondeformed Remington bullet extracted through zygomatic fossa and between zygomatic process and sigmoid notch. Nasal process, right superior maxillary bone shattered; floor of left orbit fissured and posterior surface left superior maxillary bone perforated. Track of bullet irrigated; rubber drainage tube inserted through entire track and antiseptic dressings applied.

Operation May 25, 1900: Tenderness along left upper molars, continued inability to masticate and œdema over anterior surface left superior maxillary region led to suspicion of pus in left antrum. Second molar tooth was extracted (and placed in antiseptic solution with view to its being subsequently replaced in jaw). A puncture was made into floor of antrum. No pus was found.

Gunshot fracture of humerus.—H. C. L., private, Company H, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, region left elbow. General condition, fair. Diagnosis made on *Relief:* Two severe gunshot wounds left arm. (1) Entrance, inner side of arm, 2 inches above and one-half inch within external condyle. Exit, posterior surface, median line, 4 inches above tip of olecranon, fracturing humerus. (2) Entrance, one-half inch above and one-half inch within external condyle, antero-external surface. Exit, posterior surface, one-half inch above and one-half inch within wound of entrance. All wounds badly infected. Great general tumefaction. Received in action at Catubig, Samar, P. I., April 16, 1900.

Operation May 1, 1900: Humerus found fractured, obliquely from before, backward, and upward, line of fracture being opposite upper wound at junction of lower and middle thirds. Supercondyloid ridge notched along track, lower wound. Several small fragments of bone removed, and brass-jacketed Remington, greatly deformed, found beneath deep fascia, behind lower wound of exit. Rubber drainage tubes inserted and plaster of paris splint applied.

Gunshot fracture of humerus.—F. E., private, Company K, Eighteenth Infantry, nited States Army. Transferred to hospital ship *Relief*, from hospital Eighteenth nfantry, Capiz, Panay, P. I., April 19, 1900.

Diagnosis on transfer slip: Partial anchylosis of right elbow, result of gunshot ound with compound comminuted fracture of lower third, humerus. Received in ngagement with insurgents February 5, 1900, at Dao, Panay, P. I. Condition on dmission: Géneral health, excellent. Diagnosis made on *Relief:* Severe gunshot ound right arm. Wound of entrance on outer surface of right forearm, 4 inches elow external condyle; exit posterior surface of arm, 4 inches above olecranon process. Wound of entrance one-half inch in diameter. Wound of exit; large rregular scar, 4 inches long and 1½ inches wide. Both wounds healed. Elbow joint nchylosed (fibrous). Humerus broken, fibrous union, lower fragment tipped inward nd forward at angle of 120° with upper fragment. Seat of fracture 2 inches above lbow joint. Wrist and fingers anchylosed (fibrous).

Operation, May 5, 1900: Anchylosis of fingers, wrist, and elbow broken up under næsthesia. Humerus refractured. Fragments manipulated. Arm reset, right ngle splint.

Gunshot fracture of ulna.—G. H. O., private, Company C, Forty-third Infantry, nited States Volunteers. Transferred to hospital ship *Relief* from First Battalion hospital, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Shot in skirmish with insurrectos, between Tannan and Dagame, Leyte, P. I., March 31, 1900. Entrance wound, anterior internal surface, middle third, right forearm. Exit wound, posterior external surface, same region, causing compound comminuted fracture of ulna, and probably dividing ulnar nerve. By bullet, probably Remington. Severe. General condition on admission, fair. Slight evening temperature. Diagnosis made on *Relief:* Severe gunshot wound of right forearm. Entrance, inner surface of forearm in line with and 4 inches below inner condyle. Wound nearly closed. Slight exuberant granulations. Exit, ulnar side, one-half inch internal and 5 inches below olecranon process, large granulating wound 4 by 1½ inches, discharging pus. Deep cavity in center leading to space from which fragments of ulna have been taken. Wound cleansed and antiseptic dressing applied. X-ray examination showed 3 inches of ulna gone at junction of upper and middle third; also foreign body 4 inches below crease of elbow, and one-half inch internal to the radius.

Operation, May 5, 1900: Two small fragments of shell, ¼ by ⅛ inch each, and 1 inch carious bone from lower fragment of ulna removed. Suppurating cavity irrigated and packed with iodoform gauze.

Gunshot wound of abdomen.—P. M., private, Company B, Fourth Cavalry. Transferred to the hospital ship *Relief* from field hospital, Niac, P. I., January 10, 1900.

Diagnosis on transfer slip: Perforating gunshot wound (Mauser). Entrance, 1 inch to right and above symphysis pubis. Exit, 2 inches above and posterior to great trochanter, right femur, ball passing through abdomen and ilium. Received in action near Niac, P. I., January 9, 1900.

Operation, January 11, 1900, 8 p. m.: Incision from navel to symphysis. Localized peritonitis, lower part of abdomen. Perforation one-half inch in diameter, in ileum, sewed up with Lembert suture. Cavity flushed and drainage established. Died 12.20 a. m., January 12, 1900, from shock following peritonitis, result of severe perforating gunshot wound of abdomen.

Gunshot wound of ischium.—C. C., sergeant, Company H, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief* from regimental hospital, Forty-seventh Infantry, United States Volunteers, Legaspi, P. I., May 2, 1900.

Diagnosis on transfer slip: Severe perforating wound of body. Wound of entrance 4 inches above Poupart's ligament. Wound of exit posterior aspect, junction of middle and upper third, left thigh. Slight nonpenetrating wound, front of right thorax, contused, 4 inches long and 2 inches to left of sternum. Wounded near Ligas, April 11, 1900. Both wounds caused by Remington bullet, fired from a hill not over 30 paces. Condition on admission, fair. Pulse slow, soft, and compressible. Temperature, 99°. Skin, normal color. Patient in good flesh. Tongue slightly coated. Diagnosis made on *Relief:* Slight abraded wound, 3 by ¾ inches along costal margin, left breast. Gunshot wound, left groin. Entrance midway between anterior superior spine of ilium and symphysis pubis. Wound of exit, left buttock, one-half inch below tuberosity of ischium. Skin undermined about wound of entrance for a distance of 2 inches below wound. Induration surrounding wound of exit. Slight discharge on admission; no odor. Small amount of pus from each wound on pressure. Track of ball irrigated from below, water coming through upper wound free and clear. Gauze dressing applied. Condition remained much the same until

10 a. m. May 5, when temperature rose to 104.8°. Examination of blood showed no plasmodium malariæ.

Operation, May 6, 1900: Both wounds enlarged. Tuberosity of ischium found grooved one-third inch deep along internal surface. Several minute fragments of bone and piece of jacket of bullet ½ by ¼-inch removed. Track of bullet curetted. Through and through rubber drainage tube inserted and antiseptic dressings applied. Temperature dropped immediately after operation, reaching normal on third day.

Gunshot fracture of thigh.—J. J. H., sergeant, Company A, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief*, from hospital Forty-seventh Infantry, Donsal, Luzon, P. I., May 9, 1900.

Diagnosis on transfer slip: Perforating gunshot wound, left thigh, lower third, with fracture. Wounded in action at Bonaugurau, Luzon, Friday, May 4, 1900. Condition on admission, good. Temperature, 102°. X-ray examination negative. Both wounds foul. Much swelling of thigh and leg. Large ecchymosis around wound of entrance. Diagnosis made on *Relief*: Severe gunshot wound, left thigh. Entrance 4 inches above upper border of patella, passing transversely through, producing compound comminuted fracture of femur. Exit posterior surface median line, on same plane as entrance. Both wounds 1 inch in diameter, evidently caused by Remington. Received in action at Bonaugurau, Luzon, P. I., May 4, 1900.

Operation May 10, 1900: Free incisions made over both wounds. Bone found shattered for distance of 1½ inches above and 1½ inches below line of bullet. Lower fragment of shaft drawn downward and backward behind upper fragment. Eight or ten small fragments of detached and denuded bone, from ½ to 2 inches in length, removed. Ends of upper and lower pieces of bone found denuded for 1 inch and removed with bone forceps. Through and through rubber drainage inserted, wounds packed with iodoform gauze, antiseptic dressings and splints applied.

Gunshot fracture of thigh.—L. R., private, Company G, Forty-third Infantry United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, right thigh, with fracture femur. Bullet extracted May 1, 1900. Condition on admission, poor, emaciated, restless. Pulse, rapid. Temperature, 102.2°. Diagnosis made on *Relief:* Severe gunshot wound right thigh: Entrance, 4 inches above inner border of patella. Exit at junction of internal and posterior surface of thigh, one-half inch below wound of entrance, producing compound comminuted fracture of lower third of femur. Thigh much swollen and ecchymosed.

Operation, May 2, 1900: Examination showed oblique fracture from above downward and forward at junction of middle and lower third; several fragments of detached bone, ranging in size from ½ to 1 inch, removed. Sinus burrowing upward behind adductor muscles, found and curetted. Counter opening made 4 inches above wound of exit. Three pieces of lead ¼ inch in diameter and one piece denuded bone 2 by ½ inches removed. Wound irrigated. Rubber drainage tube inserted, antiseptic dressing, splints, and extension applied.

Gunshot fracture of thigh.—G. A. W., first sergeant Company I, Twenty-third Infantry, United States Army. Transferred to hospital ship *Relief* from regimental hospital Forty-third Infantry, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wound, left thigh, probably Remington bullet. Entrance wound anterior internal surface, middle third, causing compound comminuted fracture of femur. Exit, posterior external surface. Severe. In battle with insurrectos at La Paz, Leyte, P. I., April 26, 1900. Condition on admittance, poor. Pulse, small, thin, rapid, and irregular. Temperature, 101.4°. Some emaciation. Complexion, dark and muddy. General exhaustion, all indicating profound sepsis. Wounds of entrance and exit both foul, exuding chocolate-colored grumous pus, extremely malodorous. Thigh greatly swollen and œdematous. Abscess cavity at posterior surface of thigh containing at least 6 ounces of pus.

Operation May 1, 1900: Three detached fragments of bone, each about 1½ by ½ inches, lying in track of bullet, were extracted. Marrow cavity, both fragments, filled with dark, grumous, foul-smelling pulp. This was curretted. Anterior surface of upper fragment denuded for distance of 3 inches from fracture. Line of fracture oblique; extending upward and backward, displacement slight. Amount of shortening ½ inch. Muscular tissue broken down and pulpified in all directions. Numerous sinuses filled with pus were opened and cleansed. Through and through rubber drainage tubes inserted. Cavities thoroughly flushed and packed and antiseptic dressings and splints applied. Throughout the operation patient's pulse were weak and irregular, necessitating several injections of strychnine and atropine. On recovering consciousness, condition still being bad, two quarts of saline infusion were given subcutaneously. Patient rallied somewhat from the immediate effects of the operation, but died from exhaustion and sepsis twenty-four hours later.

Gunshot wound of thigh, etc.—H. C., corporal, Company A, Forty-third Infantry, United States Volunteers. Transferred to the hospital ship *Relief* from First Battalion hospital, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wounds as follows: Bullet entered left leg at outer surface, upper third of thigh, and emerged from inner surface same region, passing behind bone; then entered right leg, inner surface, lower third of thigh, and lodged against bone, from whence it was removed. Severe. Contused lacerated wounds (slight), as follows: One, back of left elbow; one, outer surface, left arm; and one, anterior surface, right wrist. Wounds in leg inflicted by Remington bullet, and those in arm probably by chips fired from a gun. Fired upon by insurrectos on April 27, 1900, while traveling the road between Tacloban and Polo, Leyte, P. I. General condition, good. Diagnosis on *Relief:* (1) Severe gunshot wound left thigh. Entrance, 6 inches below and 1 inch posterior to great trochanter; direction, inward, emerging same plane as wound of entrance, on inner surface (bone not involved); then entered (2) right thigh, on internal surface, 4 inches above internal condyle. No exit. Wound of entrance in left thigh presents sloughing surface 1½ inches in diameter. Exit wound clean, one-half inch in diameter. Through-and-through rubber drainage established, and antiseptic dressings applied. Wound in right thigh 1¼ inches in diameter and very ragged, penetrating to depth of 2 inches. Patient states bullet was extracted from this wound. Bone not involved. Wound irrigated and packed with gauze. Antiseptic dressings applied. (3) Slight abraided gunshot wound, posterior surface, center of left forearm, 2 inches long; direction vertical. (4) Slight abraded gunshot wound over internal condyle, left humerus. (5) Slight penetrating gunshot wound, anterior surface right wrist. X-ray examination showed small foreign body lying in front of base of fifth metacarpal bone.

Operation, April 30, 1900: Incision made and two fragments of shell, each one-fourth inch in diameter, removed. Incision sutured. Antiseptic dressings applied.

Gunshot fracture of thigh.—E. E. S., private, Company M, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Perforating gunshot wound, right thigh, with fracture of right femur. Bullet entered near trochanter, and passing toward the left, emerged on inner aspect of leg. Exact character of bullet not known. Also a perforating incised wound of left leg from a spear. The spear entered on outer aspect of thigh 3 inches above knee and emerged on outer aspect of leg 3 inches below knee. Injury received in engagement with insurrectos at Cagayan, Mindanao, P. I., April 7, 1900, during an attack on the town at 5 a. m. General condition, excellent. Diagnosis made on *Relief:* (1) Severe gunshot wound, right thigh. Bullet entered outer surface one-half inch below great trochanter, passed inward and backward, fracturing femur, emerging posteriorly at gluteal fold, 1½ inches from anal orifice. (2) Severe contused wound, left lower extremity, inflicted with a spear. Spearhead entered on outer aspect of thigh 3 inches above knee and emerged on outer aspect of leg 3 inches below knee, severing larger part of head of fibula. Received in action at Cagayan, Mindanao, P. I., April 7, 1900.

Operation, April 12, 1900. Wounds right thigh clean. Simple dressings and splints applied. Wounds left thigh and leg very foul and covered with fungous granulations. Spear wounds enlarged, cleansed, and swabbed out with pure carbolic acid, followed by alcohol. Severed piece of head of fibula three-fourths inch long removed. Abscess cavity found in popliteal space, left side, immediately behind track of spear. Opened, irrigated, and curetted. Two large rubber drainage tubes inserted, one from thigh wound to popliteal opening, other from leg wound to popliteal opening. Antiseptic dressings applied. Wounds right thigh healed in a few days, leaving small linear scars scarcely visible in five weeks' time; evidently caused by Mauser. Much displacement forward and outward of upper fragment. Inclined plane 2 feet high at base placed under limb. Twenty-five pounds extension applied. Heavy pad placed over upper fragment. Position of fragments with these appliances was good. Irritation of skin at points of pressure was so great, due to heat and profuse perspiration, that extension and pressure over upper fragment had to be frequently removed and ulcerated skin treated. Due to this, and in spite of numerous devices tried, this fracture united with 3 inches of shortening and much deformity of the upper fragment. The wound of the left lower limb healed slowly by granulation.

Operation May 25, 1900: Pressure on the sharp projecting upper fragment of the right femur became so great as to indicate speedy ulceration. An incision was made and 1½ inches of bone removed with bone forceps. The incision was closed and an aseptic dressing applied.

Gunshot fracture of femur.—C. M., sergeant, Company I, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Penetrating gunshot wound of left thigh. Bullet entered just in front of trochanter and, passing diagonally backward, lodged just under skin in left buttock. Left pelvic bone probably suffered partial fracture, but left hip joint and femur apparently escaped injury. Injury received in engagement with insurrectos at Cagayan, Mindanao, P. I., April 7, 1900, during an attack on the town by the insurrectos at 5 a. m. General condition on admission, fair. Temperature, from 101° to 102°. Pulse, 120. Diagnosis on *Relief:* Severe gunshot wound, left thigh. Bullet entered laterally below great trochanter, passed diagonally backward, and lodged under skin of left buttock, about 2½ inches from anal orifice.

Operation, April 12, 1900. Wound foul. Upper portion of femur extending 1½ inches below great trochanter found shattered. Left ilium partially fractured from acetabulum upward. Incision made through skin over bullet, which, with several fragments of denuded bone from 1 inch to 2 inches long, was removed. Through-and-through rubber drainage inserted. Wound packed with iodoform gauze. Antiseptic dressings and splints applied. Temperature and pulse remained about the same as before the operation. Patient grew steadily weaker and more apathetic. A week after operation a distinct odor of dead bone was perceptible on changing dressings.

Operation, April 21, 10 a. m.: Head of femur excised. Tip of lower fragment sawed off. Excised fragment found carious. Wound packed with gauze and dressings applied. Throughout operation patient's pulse very weak and irregular. Hypodermic injections of strychnine given up to one-tenth grain. Also warm saline infusions injected under skin of flanks up to 2½ quarts. Patient regained consciousness and conversed with those near by, but sank rapidly again, and died at 3.15 p. m., April 21, of septicæmia and shock.

Gunshot fracture of femur.—W. D. H., private, Company I, Thirty-eighth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital Thirty-eighth Infantry, Batangas, P. I., March 26, 1900.

Diagnosis on transfer slip: Severe gunshot fracture (Mauser) lower third, right thigh. Ball entered outer aspect of thigh, just below middle, passing slightly downward to inner side of thigh. No exit. Received in action near Cuecera, Luzon, P. I., March 15, 1900. X-ray examination showed fracture of femur at junction of middle and lower thirds, with bullet lying against bone on inner side. General condition poor.

Operation, March 27, 1900. Wound foul. Incision two inches long made on inner side of thigh. Dissection made down to femur; deformed Mauser bullet extracted. Foul wound of entrance curetted. Several small loose fragments of bone removed. Wound irrigated, rubber drainage inserted. Antiseptic dressing, splints, extension, and counter extension applied. May 10, good union of bone. Wounds nearly healed.

Operation, May 26, 1900: Both wounds are closed. Patient has had for several days an irregular temperature, ranging from 100° to 103°, with some pain in region of the fracture and slight fluctuation on anterior surface of thigh over seat of fracture. Old wounds were incised. About one-half ounce of sanious pus removed. An opening 1 inch long by one-fourth inch wide was found on posterior surface of femur, leading into marrow cavity. Marrow cavity smooth and empty for distance of about 3 inches in each direction. Rubber drainage inserted into marrow cavity in each direction and antiseptic dressings applied. Temperature normal the following day.

Gunshot injury of femur.—W. M., private, Company I, Twenty-third Infantry, United States Army. Transferred to hospital ship *Relief* from hospital First Battalion, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wounds as follows: (1) Small-caliber bullet, probably Krag or Mauser, entered right leg 2 inches to right and below anterior superior spinous process of ilium, ranged downward and inward, and emerged from posterior internal portion upper third of thigh. (2) Remington bullet entered inner side left instep and, passing downward, emerged from sole of foot beneath instep. During attack at La Paz, Leyte, P. I., April 26, 1900. Moderately severe. Condition on admission, fair. Temperature, 101°. Extremely anæmic. Diagnosis made on *Relief:* (1) Severe gunshot wound right thigh. Entrance, outer side right thigh, 3 inches below anterior superior spine of ilium; exit, at junction of internal and posterior surface, 2 inches below gluteal fold. Entrance wound, one-third inch in diameter; exit, same size. Free motion. Hip joint not involved. Slight purulent discharge from both wounds. Much ecchymosis on internal posterior surface of thigh, extending 5 inches below wound of exit. Foreign body felt on palpation 2 inches below wound of exit. Incision made, under cocaine (May 3, 1900), and deformed

Remington bullet with shell removed, each lying separately. Dressed antiseptically. (2) Slight gunshot wound of right foot, 2½ inches below internal malleolus. Exit, center of plantar surface, 2 inches from wound of entrance. Entrance wound, 1 inch in diameter; exit wound, one-half inch in diameter. Both irregular. Bone not involved. Drainage inserted and antiseptic dressing applied. Temperature dropped to 99.2° second day after admission, or sixth day after injury; ranged between 99.2° a. m. and 100° p. m. until May 6, sixth day after admission or tenth day after injury, when he experienced a slight chill at 10 a. m., followed by rapid rise of temperature, reaching maximum of 104.6° at 7 p. m. Temperature of following morning, 102.6°. Patient complained of much pain and tenderness along the bullet track; slight swelling just below Poupart's ligament, with pain on pressure.

Operation, May 7, 1900: Wound of entrance found healed. Vertical incision 4 inches long made, with wound at center of incision; dissection made down to great trochanter; nothing abnormal found. Wound of exit exuding small amount of grumous pus; this wound enlarged by vertical incision 4 inches in length. Large sloughing sinus found extending down to bone just above lesser trochanter. Deep groove found extending obliquely from above downward across anterior surface of shaft just above lesser trochanter. Numerous small fragments of bone, together with fragment of brass-jacketed Remington one-half by one-half inch, removed. Muscular tissue surrounding the sinus much softened and broken down. Cavity curetted and large drainage tube inserted from wound of entrance to wound of exit in front of bone. Cavities packed with iodoform gauze and antiseptic dressing applied.

Gunshot wound of thigh.—C. L. B., corporal, Company D, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital, Neuva Caceres, Luzon, P. I., May 7, 1900.

Diagnosis on transfer slip: Gunshot wound, upper third right thigh. General condition on admission, good. Wound foul. X-ray examination negative as to foreign body. Femur seen clearly throughout entire length and found not fractured. Diagnosis made on *Relief:* Moderate gunshot wound, right thigh. Entrance: At apex of Scarpa's triangle. No exit. Received in action near mouth of Rio Picol, southern Luzon, P. I., February 27, 1900.

Operation, May 9, 1900: Wound enlarged by vertical incision, and drainage tube, 5 inches long, discovered and removed. This tube was lying at a depth of 1 inch below surface, and according to patient's statement had been there since shortly after injury, two months before, it being supposed to have slipped out of the wound during change of dressings, and to have been lost. The sinus formed by this tube was curetted and packed with iodoform gauze and antiseptic dressing applied.

Gunshot fracture, kneejoint.—G. W. H., private, Company I, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief* from regimental hospital, Forty-seventh Infantry, United States Volunteers, Legaspi, P. I., May 2, 1900.

Diagnosis on transfer slip: Penetrating gunshot wound, inner side right kneejoint. Received in action near Malabog, April 20, 1900. Condition on admittance, fair. Pulse, full and rapid. Temperature, 102°. Skin, sallow. Tongue covered with yellow coating. Entire right leg swollen from center of thigh down. Marked œdema below wound. Both incisions, together with wound of entrance, exuding thick, creamy pus. Dressing saturated. Foul odor. Diagnosis made on *Relief:* Severe gunshot wound. Entrance, one-half inch behind and one-half inch below internal tuberosity, right tibia. No exit. Two additional openings in postero-internal surface, one 2 inches below popliteal space, one 7 inches below popliteal space. Drainage tube connecting both wounds.

Operation, May 3, 1900: Wound of entrance enlarged. Lower surface, inner tuberosity of tibia, found shattered; numerous fragments of bone removed. Mauser bullet in two fragments, together with fragments of shell, found and removed. Bone curetted, rubber drainage tube inserted, cavities packed with iodoform gauze, and antiseptic dressings applied. Temperature dropped immediately, reaching normal third day after operation.

Gunshot fracture of fibula.—M. J. E., private, Company H, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, calf of right leg. General condition, fair. Temperature, 100°. Diagnosis made on *Relief:* Severe gunshot wound, right leg. Entrance, inner side of calf, 5 inches below internal condyle. Exit, outer surface, 4 inches below head of fibula, one-half inch anterior to wound of entrance. Fibula fractured. Both wounds slightly purulent. Received in action at Catubig, Samar, P. I., April 19, 1900.

Operation, May 1, 1900: One and one-half inches of shattered fibula removed. Drainage tube inserted, connecting both wounds. Irrigated and antiseptic dressing applied.

Dagger wound of arm.—R. M. L., corporal, Company G, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 21, 1900.

Diagnosis on transfer slip: Punctured wound by dagger, left arm, flesh. Diagnosis made on *Relief:* Severe punctured incised wound, by dagger, left arm. Received in action at Kalbayok, Samar, P. I., April 26, 1900. Entrance, middle of anterior surface, left arm, 3 inches above bend of elbow. Wound transverse, 1¼ inches long. Exit, posterior surface of arm on plane 1½ inches above wound of entrance. Both wounds entirely healed when patient was admitted. Bone apparently not injured. Section of musculo-spiral nerve, manifested by wrist drop and paralysis of extensor muscles of forearm. Biceps partially severed.

Operation, May 6, 1900: Incision (vertical) 2 inches long, posterior surface of arm, in line between biceps and triceps; musculo-spiral nerve found severed and ends retracted, each end curled upon itself. Large bulbous swelling on proximal end. Bulbous swelling excised, distal end fastened, and nerve sutured. Incision closed and antiseptic dressing applied. Wound healed by first intention, but no recovery in function of nerve occurred.

Bolo wounds.—F. E. F., private, Company I, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Diagonal incised wound right arm, lower third, outer aspect, 3 inches long, and in depth extending to the bone. Transverse incised wound 3 inches long on left side of neck, having its center 2½ inches below left ear. Transverse incised wound across dorsum of left scapula 6 inches long and in depth extending to the bone. Diagonal incised wound beginning near posterior termination of preceding and extending downward and forward across posterior termination of axillary fold onto outer aspect of left arm. Length of wound, 8 inches. All these wounds were inflicted by bolos in hands of insurrectos during an attack by them upon the town of Cagayan, Mindanao, P. I., at 5 a.m., April 7, 1900. General condition, good. Wounds nearly healed. Wrist drop and paralysis extensors right forearm.

Operation, April 12, 1900: Wound opened. Long head biceps found severed. Musculo-spiral nerve half severed, bruised, and softened. Injured portion resected, nerve ends sutured with fine silk. Ends of biceps fastened and sutured. Skin sutured. Four days after operation wound found infected; opened, irrigated, and packed with iodoform gauze. Condition May 31: Wound healed by granulation. Extension regained in fingers. Pronation in forearm. No improvement in wrist drop.

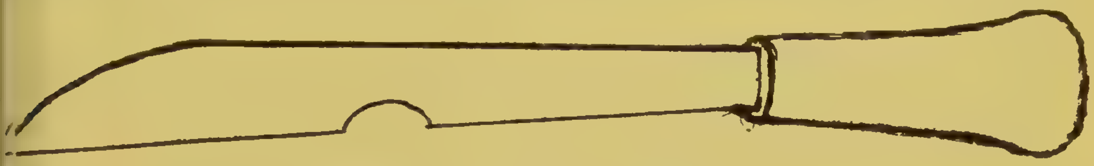
Bolo wound of neck, reported June 1, 1900, by C. F. de Mey, acting assistant surgeon, Bongao, P. I.—Sergeant Egbert V. de Wolfe, Corporal McGatt, Musician William F. Carter, Private Webster F. Gibbons, and Private John Greathouse, all of Company H, Twenty-third Infantry, left this post January 27, 1900, for Lawi-Lawi Island on a hunting pass. On January 29 the party was surprised by a number of hostile Moros armed with parongs or bolos. At the time of the attack Corporal McGatt was bathing in a creek some distance away, and thus escaped harm. The Moros stole upon the others, who were playing cards, from the rear. Sergeant de Wolfe was instantly killed, being almost decapitated at a blow. Private Gibbons died shortly afterwards from his wounds. Musician Carter was wounded in the back, and private Greathouse, the subject of this report, received a dangerous cut in the neck.

His injury was an incised wound of the severest type, so severe, indeed, that his recovery therefrom is little short of marvelous. It extended along the right side of the neck from a point immediately over the axis to a point half an inch from the mental process. The extent and gravity of this wound may be inferred from the following data: It was 7 inches in length by 6 inches in width. It divided the trapezius, sterno-mastoid, platysma, and masseter muscles, severed the occipital and external carotid arteries and external jugular vein, laying bare the axis and internal carotid artery, which vessel only escaped by a fraction of an inch. The facial artery remained uninjured, owing to a defect in the blade of the knife. It will be seen on examining the sketch of the parong, inclosed herewith, that the edge is notched by a curved indentation, a little more than halfway from the point to the handle, in the dullest portion of the blade. The blow must have been a backhanded one, delivered from the right and to the rear of the victim. This brought the indentation opposite the facial artery, over which it formed a bridge on the ramus of the jaw. It tore out a piece of flesh 3½ by ½ inches from the neck. On infliction of the wound the man's head was drawn over onto his left shoulder by the traction of the muscles on that side. In this condition he remained for sixteen hours before I saw him. The only treatment he received was at the hands of Corporal McGatt, the unwounded man.

This consisted in tying a handkerchief, previously soaked in sea water, over the gaping wound. This same corporal brought back the dead and wounded to the post. When the nature of the wound and the injury to the vessels and tissues involved are taken into consideration, together with a rough voyage in an open boat for a distance of 34 miles, it is wonderful the man survived the hemorrhage and shock.

On examination the edges of the wound were found to have shriveled and turned inward, due, no doubt, to the astringent action of the sea water, which is very marked in these parts. The external carotid had retracted within its sheath, but was still bleeding slightly. The ramus of the jaw was fractured from the impact of the parong, and several spiculæ of bone were removed. The wound was packed with antiseptic gauze, drainage inserted, and the edges brought into opposition by eleven stitches. In twenty-four hours examination showed that, owing to long previous exposure, asepsis could not be obtained. Several sutures had torn loose, owing to degeneration of the surrounding tissues. I then decided to abandon the effort to secure union by first intention and let the wound heal by granulation. This it did, with proper attention, in seven weeks.

The recovery of a subject from a wound of this severity has never been paralleled in my experience. He is in the best of bodily health and physical condition at the present time, and is apparently none the worse for his experience, beyond the loss of lateral and rotary motion of the head upon the axis, which will partially return in time.



LENGTH OVER ALL 15 INCHES — HANDLE 5 INCHES

FILIPINO SANITARY CORPS.

In a report dated June 13, 1900, Maj. Charles F. Mason, surgeon, Twenty-sixth United States Volunteers, gave a brief account of the sanitary corp of the insurrecto army on the island of Panay, as it existed up to November 9, 1899, when our advance from Iloilo disorganized and scattered their troops. The personnel consisted of 1 chief with the rank of lieutenant-colonel, 1 director and 1 subdirector with the rank of major, 4 captains, 10 lieutenants, and 140 litter bearers. Only 2 of the officers (the chief and the director) were medical graduates (medicos titulares); the others were students or practicantes. The equipment was crude, scanty, and improvised. The litter bearers were provided with bags containing a few bandages, dressings, and a paper of iodoform. The litters were improvisations of bamboo, borne each by two bearers; but hammocks also were much used, swung from a bamboo pole on the shoulders of two or four men. There were no wheeled vehicles. Four stations were established at suitable points near their trenches, from which, after first aid had been given, sick and wounded men were sent to the base hospital at Santa Barbara. This hospital occupied several private houses, and was fairly well supplied with cots, medicines, and dressings. The two medical graduates were stationed here. All the members of the sanitary corps served without pay, and, according to Major Mason, their work was exceedingly creditable.

FIELD MANEUVERS OF THE GERMAN ARMY, 1899.

The following report by Dr. John McG. Woodbury, on medico-military conditions in the German army, as seen by him during the field maneuvers of 1899, is submitted as of interest to our medical officers serving in the field:

BERLIN, *October 1, 1899.*

SIR: I have the honor to report that upon receipt of your commission and instructions, June 25, I sailed for Germany, proceeded to Berlin, and reported at the United States embassy there. The following day I was introduced to the Reichscancellor, Prince Hohenlohe, by his son. This was a social and not a formal embassy presentation. The following day he invited me to dine to meet the surgeon-general of the German army, who detailed an officer of the same rank as my own to accompany me to whatever points of interest I might find in Berlin, especially recommending the inspection of the Kaiser Wilhelm's Academy, the train depot, the Lazareth Elizabeth, the casernes of the First Guard Dragoon Regiment, and the Kaiserin Augusta Regiment No. 4. These I duly visited, after calling formally, in company with Mr. Jackson, our chargé d'affaires, upon the ministry of foreign affairs, and, in company with Captain Allen, upon the ministry for war and the surgeon-general.

My papers, together with the formal application from the State Department to the foreign office of the German Empire for permission to inspect and study the medico-military conditions of the German army in active field maneuvers, being transmitted to the proper authorities, I received word that I should be presented to the Emperor after the parade, September 1, 1899, in the Tempelhoferfeld, and that I should report at the general-kommando of the Sixth Armee Korps, upon the 8th of September, in Breslau.

A mount being provided for me by order of the foreign office at the caserne of the First Dragoon Guard Regiment I rode at the parade, in the Tempelhoferfeld, and at the finish of the review was presented to His Majesty, who received me with great cordiality and kindness, saying that "all medical and sanitary information should be at the disposition of the United States Government."

Upon September the 8th I presented myself at the general kommando of the Sixth Armee Korps, in Breslau, received instructions to proceed at once to the stadsquartier of the Twenty-second Infanterie Brigade, in Schildberg, in Posen. I proceeded at once to Schildberg and reported to General-major and Brigade Kommandeur Graf von der Goltz. I was most heartily received, and, beginning with regimental formation, had opportunity to study in quatier-nothquatier and in bivouac the German army, as represented by the Sixth Armee Korps in active field operations along the Russian frontier. Thus I was permitted to observe and study the methods of feeding commands, and the preparation of food in the companies, with the methods of sleeping the men in bad weather, and to study the relationships existing between the officers and the enlisted force.

From the headquarters of Graf von der Goltz I was transferred to the headquarters of General-major and Divisions Kommandeur Stephani, where I had opportunities to study organization and arrangement for the division; and from there again transferred to the headquarters of the Hereditary Grand Duke of Saxe-Meiningen, commanding the Sixth Armee Korps.

Every opportunity was given me to be present at the various inspections, also, in accompanying the maneuvers, to observe the location of the various dressing stations upon the field of battle; also the methods for transportation and the care of the wounded. This armee korps was fully equipped and the sanitats detachment had the quota of field hospitals, medicine wagons, litters, and bearers.

MEDICAL SERVICE.

The medical service is directly under the medical division of the war ministry, and is presided over by the surgeon-general of the army, who at the present time has the rank of lieutenant-general. The medical corps consists of:

(1) Military doctors with assimilated grades of commissioned officers (sanitats offizier korps).

(2) Military doctors graded as noncommissioned officers (sanitats unteroffizierе).

(3) Nurses, sick bearers, and hospital attendants.

The following are directly subordinated to the surgeon-general: The Kaiser Wilhelm Academie; the examining commission for surgeons; the corps surgeons above major, called general-arzte.

CORPS SURGEONS.

The corps surgeons, colonels or higher, take charge of the corps sanitary service under instructions of the corps commanders and the surgeon-general. In each corps sanitary bureau there is one surgeon with the rank of lieutenant, one corps apotheary, and ordinarily one attached surgeon, with the rank of captain, who is at the head f the microscopic station of hygieno-chemical research. The economic administraion is entirely under the corps intendancy.

MEDICAL OFFICERS WITH TROOPS.

1. Each division has a division surgeon with the rank of colonel, who is adviser of he division commander. He conducts sanitary measures within the division, and is hief surgeon of the garrison hospital at division headquarters unless otherwise rovided by order.

2. Each infantry or railway regiment has a regimental surgeon with the rank of najor or captain, and two battalion surgeons with the rank of captain.

3. Each cavalry regiment has one regimental surgeon with the rank of major or aptain, and most regiments have also one to two surgeons with the rank of lieutenant.

4. Each artillery regiment has one regimental surgeon with the rank of major or aptain, one section surgeon with the rank of captain, and one or two surgeons with he rank of lieutenant.

5. Each foot artillery regiment or independent battalion has one surgeon with the rank of captain; some have also one surgeon with the rank of lieutenant.

6. Many train battalions have each one surgeon with the rank of lieutenant.

Besides the troop surgeons there are various surgeons detailed to garrisons, to hygieno-chemical research stations, and to hygieno-chemical laboratories at certain corps headquarters.

The principal sanitary depot is in Berlin.

Each garrison hospital at corps headquarters has also a sanitary depot and a hospital pharmacy. Small hospitals have also medical and surgical stores. Four army corps have convalescent homes.

Medical officers are obtained from military surgical institutions or from graduates of other medical schools, the Kaiser Wilhelm's Akademie being the principal preparatory school.

Hospital attendants are taken from the ranks after not less than six months' service and trained in the lower branches of the sanitary service. After passing the prescribed examination they may be employed in hospitals or remain with the troops. Each army corps trains annually from 40 to 50 nurses, and litter bearers as needed.

FIELD MEDICAL SERVICE.

The medical units are: Medicine-wagon detachments, sanitary companies (sanitats-detachment), field hospitals, etappe hospitals, and war hospitals; the latter may be assigned to divisions. The medicine-wagon detachment—having 4 litters and 2 bandage knapsacks, with the necessary personnel taken from the troops—is the smallest unit. This would have one or more surgeons, two or more hospital attendants, 16 sick bearers, at the rate of 4 per company, and musicians trained as sick bearers. The troop or first dressing stations established by these units are not intended for each separate battalion, but they are combined, and, as a rule, are later submerged into the chief dressing stations (hochverband platz) of the sanitary company. Half of the sanitary personnel remains with the troops, the other at the dressing stations. This ambulance detachment is nevertheless the unit of the battalion, as far as such a unit exists. Every soldier is provided with a dressing package.

The personnel of a sanitary company consists of 8 doctors, 2 captains, 6 lieutenants, 8 hospital attendants, 8 nurses, and 176 sick bearers, corresponding to our field-hospital detail. It is divided into two platoons, and can establish two principal dressing stations. It is provided with 8 two-horse ambulances, 2 sanitary wagons, and 13 ordinary wagons, with 56 to 72 litters. Besides these, requisition wagons with straw obtained from the division intendant or returning provision and train wagons may be used.

The field hospital, of which each army corps has 12, has 200 beds, and is divided into two platoons. It has 8 surgeons, 2 captains, 6 lieutenants, 9 hospital attendants, 12 nurses, 1 supply wagon, 4 ambulances, 1 sanitary wagon, 5 medicine chests, and 5 litters. Some of the field hospitals are established as near the firing lines as immunity from the hostile fire and capture will permit, the others remain with the columns and trains. Field hospitals are directly under the command of the corps, unless they be assigned to divisions, in which case they are under the division commander.

As the troops advance, the field hospitals that have been installed are turned over to the officials in charge of the line of communications, and thus become etappe hospitals, or they are converted into permanent war hospitals. Ordinarily one platoon of each field hospital remains behind.

The idea being, however, to maintain the field hospitals as nearly as possible a strictly mobile unit, all sick and wounded are at once sent to the rear and transferred to base hospital by railway, so emptying the field hospital and permitting its organization and equipment to move forward with the advancing line.

The following diagram shows the general system employed from the field of battle to the final destination of the wounded:

Field of battle.	Medicine wagon detachments: Battalion units; first dressing stations.	Severely wounded: field hospitals.	Nontransportable: Permanent field hospitals.	
			Transportable: Sent to etappe hospitals; thence (by auxiliary hospitals and hospital trains)	Home. Reserve hospitals (private). Red Cross hospitals.
	Sanitary companies: Division units; 2 platoons each; principal dressing stations.	Slightly wounded.	Remain with the troops.	
			Directed to an assembly point and marched to etappe hospitals.	

1. *The Kaiser Wilhelm's Academy at Berlin.*—Place of instruction medical officers; course lasts five years; entrance obtained by examination; average age of student on entrance, 16; earlier courses general; last two years entirely practical hospital service in the hospitals of the various garrisons.

2. *Train depot at Berlin.*—This contains all the transportation for the First Army Corps; also all the medicine wagons, ambulances, and transportation for field hospitals of the First Army Corps. It is under the charge of an intendant, who is responsible for the property, no medical officer being responsible for any transportation or for any drugs, medical supplies, or equipment until they are issued at hospital. The entire part of this responsibility rests in the train department.

NOTES.—Amount of wagon train and transportation. See special paper of medical service.

Amount of railway transportation and equipment for sick and wounded: Six railway trains of 36 carriages each; the equipment entirely prepared and ready in Berlin; 6 in Breslau and Russian frontier; 6 in Strasbourg.

The commissary and quartermaster's department being responsible for the delivery to the battalion of all food rations and commissary supplies, the necessary transportation for such supplies is attached to the general train and quartermaster's department and not to the regimental transportation.

Caserne des ersten Garde Dragoner Regiment, Caserne der Kaiserin Augusta's Regiment, Caserne des Kronprinz Friederich's Regiment No. 11:

Casernes built of stone; wooden floors, laid on stone and cement; stone and metal stairway; no wood in walls; building fireproof. The newer type is constructed so as to contain quarters for each battalion in a separate building. The cubic air space allowed for sleeping quarters is 15 cubic meters per man; the floor space, 5 square meters per man. The mess room and canteens are in separate buildings from the sleeping quarters, and here the floors are, as a rule, tiled. Cooking is done by steam kettles, and a meat ration is rarely roasted. When so cooked it is prepared by broiling. A subaltern commissioned officer sleeps on the same floor and in front of company command. A subaltern commissioned officer inspects and eats of each meal every day when cooked and ready for issue to the men of his command. The lavatories and baths are in separate buildings, detached from sleeping quarters. Sleeping quarters contain no plumbing. Civilian employees are used as scavengers.

Sinks.—These are always placed in separate house from either sleeping or eating quarters of the men. They are arranged so as to give ample accommodations for each battalion. The commissioned officer is responsible for their sanitary condition, but they are kept clean and in order by civilian employees, who are paid to act as scavengers. They are inspected very frequently every day by first sergeants, and if not in order the scavenger is called to account. Special attention is being paid in the remodeling of old casernes and in the building of new ones to having these sinks properly constructed, thoroughly ventilated and drained.

Sinks in bivouac.—These are trenches dug 4 feet deep, 3 feet wide at the top, 2 feet at the bottom, over which is erected a rail resting on crossed stakes at either end, each man after usage being required to cover his movement with earth. A spade is kept at the sink for this purpose. The seating capacity is 16 places for every 100 men. When the troops move off the ground these trenches are completely filled, and as the same ground is never occupied by troops more than twenty-four hours, no disinfectant is necessary.

NOTE.—A descriptive list, written upon parchment with indelible ink, is sewn inside the inner pocket of the coatee, so that each man carries with him his own descriptive list, which can not be destroyed in any way except by fire.

3. *Lazareth Elizabeth.*—Excellent military hospital in perfect order. Quality and amount of food equal to our own; preparation better. Each patient has a wine ration. General construction of all base hospitals on pavilion plan.

NOTE.—Tentage is never used in Germany for hospital purposes except in extreme cases of necessity in the first dressing station or brigade section of field hospital; soldiers are at once quartered in requisitioned buildings; this is a general policy. The pavilions built of brick, 2 stories in height, fireproof. All sinks and lavatories separated by a double partition. Operating theater of glass and marble, in separate buildings, connected by a cloister corridor.

Organization.—Surgeon in command, rank of lieutenant-colonel; two assistant sur-eons, rank of captain; internes, students from the Kaiser Wilhelm Akademie; hospital rderlies, men of third year's service desirous of entering sanitary corps. Here istruction is given to those soldiers of the sanitary corps desirous of becoming Laza-eth's helfer—our hospital steward.

Clothing.—The underclothing consists of socks or fusslappen, and these must be pro-ided by the soldier himself. He may wear either he likes, using his own discretion.

NOTE.—Fusslappen: These are made of linen, canton flannel, or knitted woolen material, varying with the temperature and moisture of the feet. They are about 4 inches wide by 18 inches long and are put on by being wrapped about the foot, starting one end smoothly under the ball of the great toe and winding like a bandage over the back of the foot from within outward, finally covering the heel, and the last corner being laid smoothly across the instep. The stockings are of the ordinary cotton or woolen manufacture.

The drawers are of canton flannel of a good quality, the shirt of flannel mixed vith cotton. A new issue which is to be made will make this shirt a knitted one. he trousers, of a coarse woolen material, are cut fairly loose. The coatee, a short rock in cut, is single-breasted and also of wool. The overcoat is long, without a ape, with a collar which may be turned up and held in place by a little hood, which is concealed in a pocket in the collar; in extreme cold weather or rain can be ut on underneath the leather helmet. This helmet is admirably adapted for shel-er from sun and rain, the lip behind keeping the wet out of the back of the men's ecks. The boots are of leather, the new issue being fair leather, are strong, heavy, nd dressed only with grease. On a march trousers are always worn in them, the eg of the boot forming an excellent legging. The shoes are of leather, with canvas pper part where the lacing comes, and are only used indoors or upon fatigue serv-ce, the boot being always worn on duty.

Each man has a brown linen fatigue suit, trousers cut loose, jacket cut Eton style, ut buttoned tight to the throat. This is of heavy drab-brown linen, about the veight of No. 6 canvas. All buttons are of solid metal; no hollow buttons, as in our ervice. Each man has a small fatigue cap, without peak or visor. This clothing is never varied, either winter or summer.

Bedding.—In barracks the beds are ticks of canvas filled with straw upon a can-as tightly stretched in an iron frame. Each man is allowed one blanket, lighter n color than ours and not as good in quality, two sheets of coarse linen, a pillow stuffed with hair, and a pillowcase.

In the field the men sleep upon straw obtained by requisition.

Food.—The quantity is sufficient, being half a pound of meat per day per man; a pound of fresh vegetables, potatoes, onions, beans, etc.; a ration of split peas or beans for soup, and 2 ounces of coffee, chocolate, or cocoa.

NOTES.—The quality is excellent.

All fresh meat is inspected by the regimental medical officer before issue, and he is responsible for its condition.

In barracks all food is prepared in kitchens separate from the sleeping quarters and cooked in steam kettles and boilers, usually in the form of stew and thick soup. The bread is heavy rye, raised with yeast, no hard bread being issued except in emergency. The ration is never varied in winter or summer, but I understand that it is varied in the German colonies in Africa and elsewhere by a further addition of rice and green vegetables. For quantities and description of difference between garrison and field ration see Major Allen's report. The constituents and character of the emergency field ration consists of 2 pounds of hard bread, 1-pound tin of preserved meat, 1-pound tin of preserved peas. (N. B.—These preserved peas contain considerable lard.) All issues are made from the intendant's bureau and brought directly to the battalion.

Field cooking arrangements.—Each man carries his own, consisting of a tin, rather oval in its short diameter. In this his provisions are carried, and when the top or lid is removed the bottom can be used as a kettle and the top as a coffeepot. In the field, usually, two men mess together, one making soup in the bottom of his pail, while the other makes coffee in the bottom of his, the tops being used as plates. There are no scraps, and there is no waste.

Equipment.—Cooking tin or provision canister carried on top of the knapsack, about 10 inches long by 4 wide by 3 in its short diameter. This is made of aluminum in the new equipment.

Canteen or water bottle; old equipment made of glass covered with leather; new equipment made of aluminum covered with leather; holds one quart.

Note.—No haversack.

Knapsack made of horsehide with the hair on, waterproof; contents, 1 pair of shoes, two extra pair of socks or fusslappen, brown linen fatigue suit, shaving materials, soap and towel, needles, thread, a lump of tallow, 50 rounds of ammunition, a pound of bread, and what conserves he may have issued to him. The overcoat with the shelter tent, which latter resembles ours, save that it is brown in color, is rolled and made over the edges of the knapsack. No blanket roll slung from shoulder to hip is allowed. Every second man carries a spade or mattock, while two men in each company carry folding canvas buckets.

Note.—Total weight of each man's equipment, pack, and piece, 60 pounds.

Cartridge boxes of leather, two in front and one behind. No cartridge belts used.

Medical department.—General management of permanent military hospitals—organization and equipment same as civil hospitals.

Organization.—Officer with the rank of lieutenant-colonel, medical department, in command. Detail of two assistants of rank of captain. A superintendent has entire charge and responsibility for all medical stores; also of all food and clothing, receives the same and issues it, superintends kitchen and inspects food, and does generally the work of quartermaster and commissary combined. This intendant would correspond to superintendent of a hospital in civil life; is always a civilian, and has no rank as an officer. The furniture, instruments, and medical and surgical equipment are all of the very best and newest type. Beds, bedding, and clothing for the sick are excellent in quality.

Dietary.—There are three grades of sick ration issued—for the very sick, special diets; for those not so ill, a soup or stew, like heavy broth, containing meat with rice and vegetables; for convalescents, strong supporting diet of roast or baked meats with potatoes, onions, etc. There is an issue of claret for medium sick and convalescents equivalent to half a pint of Burgundy or of heavy Bordeaux twice daily; for the very ill spirits may be obtained, but only on doctor's order.

Notes.—It seems to be the policy in the management of these permanent military hospitals to divorce the medical officer from all property responsibility and confine his duties entirely to the medical and surgical care of his cases; in other words, the medical officer is a doctor or a surgeon, the superintendent having all other responsibilities.

There is no such thing as a sick call in the German army. If an enlisted man falls ill or seems to be unfit for duty it is reported to the first sergeant of his company; if on inspection the first sergeant finds the man to be in need of medical care, if the case be in the barracks, he is retained in quarters until the medical officer makes his daily round, morning or afternoon; if in the field, he is picked up by the lazareths helfer and taken to the field hospital. The record is kept by the first sergeant, and the man continues to be borne on the company's strength, but as off duty. When he is returned he is simply marked for duty on the company's books; the time that he has been away is stated as "in hospital."

Field service.—Transportation of sick. The sick or wounded are carried from the firing line, where they receive their first dressing, to the "Hauptverbandplatz" by a corps of litter bearers; from there to the field hospital by ambulance, requisitioned wagons, or whatever transportation can be got. From the field hospital they are immediately forwarded to the base hospital by railway.

Note.—As all field hospitals are regarded accurately as field hospitals and never as permanent hospitals, every case that can be moved by any possibility is sent to the rear or to a base hospital within six hours, the field hospital being regarded as an entirely mobile unit. When the line in action advances the field hospital must advance with it; consequently it is regarded only as a resting place in which better dressings can be applied and only simple operations, which are immediately necessary, performed.

The German ambulance somewhat resembles our Greenleaf model, being slightly heavier, and carries four inside, two outside, beside driver, so arranged as to receive the field stretchers, which are all of one model and all the same size. Four of these stretchers, each bearing a wounded man, can be pushed into the after end of the ambulance, two on the bottom and two on steel tracks above.

Note.—Ambulance built with a perch so as to permit four wheels to turn almost at right angles.

Litters.—Wooden frame, iron ends to keep the two wooden poles rigidly apart, canvas slung between; these are light, strong, and not destructible, so arranged that if necessary the patient can be taken directly from the field upon the litters. It forms a bed for him in the hospital and, if desired, also a berth for him in the train for wounded.

Field hospitals.—Tentage is small in amount, requisition to quarters in the nearest village being always used. The Germans have a saying that "their worst quarters are better than the best bivouac," so they never use canvas when they can get the tight roof of a house. Their canvas is linen, heavier than ours, wall tent in shape, and about the size of ours. Each hospital tent is provided with a double fly; also with poles to every second seam at the side. These are all very strongly guyed to large pegs or stakes that are shod with iron, and have an iron band at the top to keep them from spreading. There are no cots with field-hospital equipment. The cases are cared for on canvas stretchers or straw. Blankets, nightshirts, etc., are furnished. Commodes, tables, washstands, pans, spit cups, etc., are generally of metal, a great deal of enameled ware being used. Cooking and messing arrangements are entirely in charge of the intendant, the medical officer not having this responsibility. The cooking is in kettle, and the same dietary is attempted as for the sick and very sick in general hospital.

First aid to the wounded.—Exactly the same as with us, the first-aid packet being almost identical. Each company has with it on the firing line the first-aid packets in the pockets of the men, these men having been previously instructed by the lazareth's helfer in methods of application. This instruction is given by a medical officer to the lazareth's helfers.

NOTE.—Lazareth's helfer about the equivalent of our hospital steward or sergeant.

These lazareth's helfers instruct the enlisted men, there being one with every company.

Medical chests, panniers, and other field appliances.—The medical chests are identical with our own. Sterilizing apparatus, bandage packages, dressings, orderly pouches, greatly resemble our own models. The "medicine wagon" which accompanies each regiment is four-wheeled, front wheels cut under to turn at right angle, two men outside. opens in the rear with two doors, contents stored in drawers and lockers.

Contents.—Surgical instruments enough for operation, full supply of medicines for a regiment of 3,000 men, dressings, bandages, gauze, sterilizing apparatus, a small biological laboratory for making cultures, etc., apparatus for examination of water, scales and weights for dispensing outfit; in fact, is a compact, thoroughly equipped apothecary shop and surgery.

Disinfectants.—These are only used in hospital, not in barracks. As there are no sinks in barracks and no plumbing of any sort connected with the sleeping quarters, no disinfectants are used, and the sinks are kept clean by scrubbing and thorough flushing with water, hired civilian scavengers doing the work. In the field, as no command is ever kept more than one day on the same ground, no disinfectant is here necessary, everything being buried and burned.

Sanitary rules and regulations.—All regulations regarding light, air, clothing, bedding, water, and bathing facilities originate in the staff department in Berlin, and are carried out by the captains of the companies. There is a saying of a company, "The captain is the father and the first sergeant is the mother." This will explain that the line officer looks after his men and sees to their personal cleanliness.

Sanitary appliances.—Water is not boiled and is not filtered, but all water before being used at any barrack is carefully analyzed by the medical officer, and when troops are to be quartered in a town the water of that town is examined before the troops are sent there. There are no disinfectant arrangements for sinks, except cleanliness and discipline; they are never in disorder. In barracks all garbage, grease, and whatever scraps may come from the ration are carefully collected in large covered barrels and sold, the purchaser removing the same twice a day. In the field all refuse about a bivouac is carefully collected and burned.

Foot inspection.—The feet of the army are most carefully considered, each man's feet being inspected by one of his company officers, a medical officer, and the lazareth helfer at least twice a week in barracks, and oftener in active field maneuvers. The method of making this inspection is to form the companies in squads, standing upon tables or benches sufficiently high to bring the feet directly under the eye of the inspecting officer, and to bring under his observation any wincing or flinching when the inspected man jumps to the ground barefooted. The inspecting officer passes down the line carefully examining the front of the feet and legs which are bared to the knees, searching for strained tendons, blisters, improperly cut nails, or untrimmed corns.

Having passed down the line, the men are about faced and the tendo-achilles carefully examined, and as they raise one foot and then the other the soles are inspected. As a man passes from the table or bench he leaps to the ground and runs to his shoes and stockings. This is to show any bruised soles or periostitis of the tarsus. Any case of blisters, improperly cut nails, or teno-synovitis are at once cared for by the lazereth helfer. More serious disorders are sent to quarters or hospital.

At the same time each man's socks or fusslappen and boots are carefully inspected as to the condition of cleanliness. As the infantry regiments average in marching a kilometer in ten minutes, being often pressed to a kilometer in from seven and a half to eight minutes, each man carrying 60 pounds, this care of feet is most necessary. When tables or benches are not available, the trunk of a fallen tree or a block of stone are made use of.

Body inspection.—The entire body of every man is inspected every thirty days by a company officer and a medical officer, careful search being made for any heart lesions, hernia, venereal disorders, skin diseases, eczemas, etc. This is in order that any physical defect may be carefully noted, cared for, and reported that might be concealed by clothing or the improper modesty or willfulness of the enlisted man.

Bivouac.—In bivouac the arrangement differs materially from our own. The German soldier and officer being provided only with a shelter tent, each man carries his own cover. The formation is by companies, by regiments, by brigades, much as our own. Ground is never occupied by troops more than twenty-four consecutive hours, fresh ground or bivouac always being found. Usually two men arrange to tent together. This being done, the one with the spade digs a trench 7 feet long by 4 feet wide, 6 inches to a foot deep. As ground for bivouac is always selected on the gentle slope of the hill, the foot of these "grabungs" is usually at the surface while the head is considerably deeper.

The shelter tent is erected and spread out over the earth thrown upon each side and at the head, while the "grabungs" are filled in with straw, requisitioned from the nearest stack, one bundle being allowed to each man. The reason for this ditching and walling of the side of the tent is to keep out rain, water, and the cold wind. In fine weather or summer the shelter tent is never erected, the men sleeping upon it and their overcoats. Officers to the rank of colonel are tented in the same way as the men, there being no discrimination made. Colonels of regiments and general officers have, however, a fly about the size of our three-seam wall canvas. The officers' mess is prepared by their servants, with approximate simplicity to that of the men.

NOTES.—I must call attention to the new bakery wagon that was tried this year for the first time in active field maneuvers of the German army. It is a wagon with 4 wheels, 10 feet long, drawn by 4 horses. The body consists of a furnace arranged for a wood fire, over which is a corrugated sheet-iron oven, the heat from which is prevented from radiating by a packing between the two skins. This is so efficient that the outside of the oven will bear the touching of the hand without burning. In front is arranged a tank for the heating of water, used in the mixing of dough, which mixing is done in a following wagon, where the loaves are shaped, placed upon boards, and prepared for the oven. The capacity of these ovens is eighty loaves baked ready for issue every hour and a half, at a speed upon the chausee of a kilometer in ten minutes.

The general effect of one of these wagons is that of an oval iron tank resting upon its short diameter, a smokestack at the forward upper end, a water tank in front, with stopcocks for drawing, fire box and doors at after end below, and doors for oven above. For fuller description, with drawing, I would respectfully call attention to the report of Major Allen, military attaché in Berlin. This mobile bread bakery has been tried with great success, and upon good roads in not too difficult country appears to give most excellent results. The old fixed oven buried in sand had a capacity of one hundred loaves every hour and a half, but the necessity for transportation from the fixed oven to troops moving renders the oven upon wheels a matter much in discussion.

I would respectfully call attention to the accompanying photographs of the new wheeled stretcher made of bent wood and for service with possibly one bearer. This was shown in the tempelhoferfeld on July 28, and met with approving comment from the surgeon-general and other medical officers of the German army. It is extremely light, and being made of wood, steamed and bent, it is less liable to damage than stretchers made of several pieces.

One bearer is able to transport with this machine over good ground as much as two bearers with the former modern stretcher.

I have been greatly aided in my work of studying and reporting upon the medico-military conditions of the German army in active field maneuvers by the able and courteous assistance of Major Allen, our military attaché in Berlin; also by the executive ability of Mr. Jackson, our chargé d'affaires at the court of the German Empire.

Very respectfully,

JOHN McG. WOODBURY, A. M., M. D., M. R. C. S.,
United States Commissioner, late Major and Chief Surgeon, U. S. V.

HON. SECRETARY OF STATE OF THE UNITED STATES.

COMMENDATIONS

With few exceptions the medical officers of our Army, both regulars and volunteers, have performed the responsible duties devolving upon them in a manner most creditable to themselves and to the service. During the calendar year 1900 Col. Charles H. Alden, assistant surgeon-general, was the senior assistant in my office. He had special charge of the supply division, and by virtue of his rank became acting surgeon-general when I was absent from the office. He was continuously upon duty in my office from August 31, 1893, until April 28, 1900, when he was retired for age. His services have been most valuable not only as principal assistant in the office of the Surgeon-General, but as president of the Army Medical School from the time of its organization until the course of instruction was suspended because of the emergencies resulting from the war with Spain. Lieut. Col. Charles Smart, deputy surgeon-general, who for many years has had charge of the sanitary and disbursing division of the Surgeon-General's Office, has, as usual, performed the important duties devolving upon him with intelligence and zeal. Maj. George E. Bushnell, surgeon in charge of the Hospital Corps division, has distinguished himself by his conscientious and intelligent attention to the interests of this important branch of the service.

Mr. George A. Jones, chief clerk, has continued to exhibit a degree of efficiency and attention to the responsible duties attached to his position which is, I believe, unsurpassed in the Government service. Through his efforts and those of the principal clerks in the several divisions of my office the work has been continuously kept up to date and has been conducted in a most systematic and thorough manner.

Among the medical officers of the Army occupying especially responsible positions the following are deserving of mention as having distinguished themselves for efficient and zealous performance of duty:

Col. Charles R. Greenleaf, assistant surgeon-general, for valuable services in the inspection and sanitary supervision of camps occupied by our volunteer troops at Savannah, Ga., Camp Meade, Pa., and the Presidio of San Francisco, Cal. (at present chief surgeon, Division of the Philippines).

Col. William H. Forwood, assistant surgeon-general, chief surgeon Department of California, whose responsibilities have been very great on account of the number of troops which have arrived at San Francisco en route to the Philippines and the number of sick returning from those islands.

Col. A. A. Woodhull, assistant surgeon-general, chief surgeon Division of the Philippines from April 18, 1899, to December 23, 1899.

Lieut. Col. Henry Lippincott, deputy surgeon-general, chief surgeon Division of the Philippines from June 26, 1898, to April 18, 1899.

Lieut. Col. A. C. Girard, deputy surgeon-general, in command of the United States general hospital, Presidio, San Francisco, Cal.

Lieut. Col. R. M. O'Reilly, deputy surgeon-general, chief surgeon Division of Cuba from January 25, 1899, to November 12, 1899.

Maj. Valery Havard, surgeon, chief surgeon, Department of Santiago, Cuba, from August 17, 1898, to April 18, 1900. (At present chief surgeon, Division of Cuba.)

Maj. John Van R. Hoff, surgeon, chief surgeon Department of Porto Rico.

A mention of all of the medical officers whose services are worthy of commendation would include the names of nearly all of those belonging to the regular establishment and a considerable proportion of those serving under volunteer commissions. Nor can I omit in this connection the acting assistant surgeons, who, as a rule, are young men well equipped for the professional work they are called upon to perform, and many of whom have distinguished themselves by the zeal and intelligence with which they have performed their duties under the most trying conditions of active field service in the Philippines.

STATISTICAL TABLES.

The following tables give in detail the statistical data on which the statements of this report are based:

I. Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1898, as compared with the corresponding data for the Regular Army in 1897, and during the decade 1887–1896.

II. Numerical view of the effects of disease and injury on the Regular Army during the calendar year 1899, as compared with the corresponding data of the Regular Army for 1898, and for the decade 1888–1897.

III. Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1899, as compared with the corresponding data for the armies in 1898 and for the Regular Army during the decade 1888–1897.

IV. Volunteer Army, 1898.
V. Volunteer Army, 1899.
VI and VII. Regular and Volunteer armies, 1899.
Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered.

VIII. Armies, regular and volunteer, 1898 and 1899. Admissions to sick report, discharges and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army during the decade 1888–1897.

IX. Number of white and colored applicants for enlistment examined physically during the year 1899, with the number accepted, rejected, and declined, and ratios per thousand.

X. Nativity of white and colored recruits accepted during the year, with ratios per thousand of accepted men.

XI. Causes of rejection among 70,311 candidates for enlistment examined during the year, with ratios per thousand examined.

International tables I, III, VI, and VII.

[It has not been practicable during the past year to gather the information necessary for the presentation of Tables II, IV, V, and VIII of the international series.]

TABLE I.—*Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1898, as compared with the corresponding data for the Regular Army in 1897, and during the decade 1887–1896.*

Total Army for the year 1898.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.	White.	Colored.
Mean strength	8,345	5,693	9,907	23,915	123,261	147,795	140,395	7,400
Total admissions to sick report	28,486	14,655	18,843	61,984	254,265	317,195	301,226	15,969
Per 1,000 of mean strength	3,413.54	2,574.21	1,901.99	2,588.6	2,062.82	2,146.18	2,145.56	2,157.97
Per 1,000 for previous year						1,186.61	1,180.84	1,248.61
Per 1,000 for preceding decade						1,243.39	1,243.02	1,252.38
Admissions for disease	26,271	13,933	17,602	57,806	237,759	296,448	281,766	14,682
Per 1,000 of mean strength	3,148.11	2,447.39	1,776.72	2,414.12	1,928.91	2,005.80	2,006.95	1,984.05
Per 1,000 for previous year						896.53	890.77	958.41
Per 1,000 for preceding decade						986.23	989.27	961.84
Admissions for injury	2,215	722	1,241	4,178	16,506	20,747	19,460	1,287
Per 1,000 of mean strength	265.43	126.82	125.26	174.48	133.91	140.38	138.61	173.92
Per 1,000 for previous year						290.08	290.07	290.20
Per 1,000 for preceding decade						257.16	253.74	287.54
Discharges for disability, all causes	46	32	170	284	1,789	2,088	1,995	93
Per 1,000 of mean strength	5.51	5.62	17.16	10.36	14.51	14.13	14.21	12.57
Per 1,000 for previous year						9.61	9.62	9.51
Per 1,000 for preceding decade						18.32	18.24	18.62
Discharges for disease	37	25	149	211	1,402	1,662	1,590	72
Per 1,000 of mean strength	4.43	4.39	15.04	8.81	11.37	11.25	11.33	9.73
Per 1,000 for previous year						7.60	7.59	7.70
Per 1,000 for preceding decade						15.07	14.97	15.40
Discharges for injury	9	7	21	37	387	426	405	21
Per 1,000 of mean strength	1.08	1.23	2.12	1.55	3.14	2.88	2.88	2.84
Per 1,000 for previous year						2.01	2.03	1.81
Per 1,000 for preceding decade						3.25	3.26	3.22
Deaths from all causes	764	276	239	1,279	2,846	4,136	3,937	199
Per 1,000 of mean strength	91.55	48.48	24.12	53.41	23.09	27.99	28.05	26.89
Per 1,000 for previous year						5.11	5.05	5.89
Per 1,000 for preceding decade						6.99	6.76	8.46
Deaths from disease	567	262	203	1,032	2,649	3,690	3,529	161
Per 1,000 of mean strength	67.94	46.02	20.49	43.10	21.49	24.97	25.14	21.76
Per 1,000 for previous year						3.14	3.18	2.72
Per 1,000 for preceding decade						4.77	4.59	6.09
Deaths from injury	197	14	36	247	197	446	408	38
Per 1,000 of mean strength	23.61	2.46	3.63	10.31	1.60	3.02	2.91	5.13
Per 1,000 for previous year						1.97	1.87	3.17
Per 1,000 for preceding decade						2.22	2.17	2.37

TABLE II.—*Numerical view of the effects of disease and injury on the Regular Army during the calendar year 1899, as compared with the corresponding data of the Regular Army for 1898, and for the decade 1888–1897.*

Total Regular Army for the year 1899.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.
Mean strength	11,969	3,347	22,922	38,238	26,208	64,446
Total admissions to sick report	35,401	8,797	60,306	104,504	46,445	150,949
Per 1,000 of mean strength	2,957.73	2,628.33	2,630.92	2,732.99	1,772.17	2,342.26
Per 1,000 for previous year	2,631.76	3,350.78	2,070.62	2,603.84	2,043.01	2,146.94
Per 1,000 for preceding decade					1,130.27	1,130.27
Admissions for disease	32,206	7,875	56,253	96,334	40,661	136,995
Per 1,000 of mean strength	2,690.79	2,352.85	2,454.10	2,519.33	1,551.47	2,125.74
Per 1,000 for previous year	2,230.18	3,204.66	1,914.23	2,341.66	1,845.81	1,937.71
Per 1,000 for preceding decade					891.70	891.70
Admissions for injury	3,195	922	4,053	8,170	5,784	13,954
Per 1,000 of mean strength	266.94	275.48	176.82	213.66	220.70	216.52
Per 1,000 for previous year	401.57	146.11	156.39	262.18	197.20	209.23
Per 1,000 for preceding decade					238.57	238.57
Number constantly noneffective	922	245	1,978	3,145	1,573	4,718
Per 1,000 of mean strength	77.04	81.27	86.29	82.25	60.05	73.22
Per 1,000 for previous year					82.83	82.83
Per 1,000 for preceding decade						
Days lost on account of sickness	336,539	89,263	722,015	1,147,817	574,389	1,722,206
For each man of Army	28.1	26.7	31.5	30	21.9	26.7
For each man, previous year						30.23
For each man, preceding decade						
Average days each case was treated	9.5	10.1	12	10.8	12.4	11.4
For previous year						14.08
For preceding decade						
Discharges for disability, all causes	305	72	456	833	934	1,767
Per 1,000 of mean strength	25.48	21.51	19.89	21.79	35.64	27.42
Per 1,000 for previous year		6.74	11.37	5.32	13	11.58
Per 1,000 for preceding decade					16.57	16.57
Discharges for disease	234	61	327	622	773	1,395
Per 1,000 of mean strength	19.55	18.22	14.26	16.26	29.50	21.65
Per 1,000 for previous year		4.15	10.68	4.51	8.05	7.40
Per 1,000 for preceding decade					13.47	13.47
Discharges for injury	71	11	129	211	161	372
Per 1,000 of mean strength	5.93	3.29	5.63	5.52	6.14	5.77
Per 1,000 for previous year		2.59	.69	.81	4.95	4.18
Per 1,000 for preceding decade					3.09	3.09
Deaths from all causes	234	38	713	985	217	1,202
Per 1,000 of mean strength	19.55	11.35	31.10	25.76	8.28	18.65
Per 1,000 for previous year	98.16	41.45	22.74	60.17	20.14	27.55
Per 1,000 for preceding decade					6.69	6.69

Deaths from disease	207	31	408	646	176	822
Per 1,000 of mean strength	17.29	9.26	17.80	16.89	6.72	12.75
Per 1,000 for previous year	61.15	39.38	18.60	42.01	17.45	22
Per 1,000 for preceding decade					4.50	1.50
Deaths from injury	27	7	305	339	41	380
Per 1,000 of mean strength	2.26	2.09	13.30	8.87	1.56	5.90
Per 1,000 for previous year	37.01	2.07	4.13	18.16	2.69	5.55
Per 1,000 for preceding decade					2.19	2.19

TABLE III.—*Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1899, as compared with the corresponding data for the armies in 1898 and for the Regular Army during the decade 1888–1897.*

Total Army for the year 1899.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.	White.	Colored.
Mean strength	20,051	3,727	39,280	63,058	42,192	105,546	98,635	6,911
Total admissions to sick report	55,135	9,401	94,096	158,632	70,778	229,885	214,578	15,307
Per 1,000 of mean strength	2,749.74	2,522.40	2,395.52	2,515.65	1,677.51	2,178.06	2,175.47	2,214.88
Per 1,000 for previous year	3,413.54	2,574.21	1,901.99	2,588.60	2,062.82	2,146.18	2,145.56	2,157.97
Per 1,000 for preceding decade						1,130.27	1,128.55	1,149.76
Admissions for disease	50,889	8,408	86,666	145,963	63,155	209,570	195,911	13,629
Per 1,000 of mean strength	2,537.98	2,255.97	2,206.36	2,314.74	1,496.84	1,985.58	1,986.51	1,972.08
Per 1,000 for previous year	3,148.11	2,447.39	1,776.72	2,414.12	1,928.91	2,005.80	2,006.95	1,984.05
Per 1,000 for preceding decade						891.70	892.94	884.42
Admissions for injury	4,246	993	7,430	12,669	7,623	20,315	18,637	1,678
Per 1,000 of mean strength	211.76	266.43	189.16	200.91	180.67	192.48	188.95	242.80
Per 1,000 for previous year	265.43	126.82	125.26	174.48	133.91	140.38	138.61	173.92
Per 1,000 for preceding decade						238.57	235.61	265.35
Discharges for disability, all causes	406	74	700	1,180	1,137	2,320	2,168	152
Per 1,000 of mean strength	20.25	19.85	17.82	18.71	26.95	21.98	21.98	21.99
Per 1,000 for previous year	5.51	5.62	17.16	10.36	14.51	14.13	14.21	12.57
Per 1,000 for preceding decade						16.57	16.52	16.40
Discharges for disease	326	62	517	905	940	1,848	1,726	122
Per 1,000 of mean strength	16.26	16.63	13.16	14.35	22.28	17.51	17.50	17.65
Per 1,000 for previous year	4.43	4.39	15.04	8.81	11.37	11.25	11.33	9.73
Per 1,000 for preceding decade						13.47	13.42	13.32
Discharges for injury	80	12	183	275	197	472	442	30
Per 1,000 of mean strength	3.99	3.22	4.66	4.36	4.67	4.47	4.48	4.34
Per 1,000 for previous year	1.08	1.23	2.12	1.55	3.14	2.88	2.88	2.84
Per 1,000 for preceding decade						3.09	3.10	3.07
Deaths from all causes	367	42	1,201	1,610	333	1,945	1,830	115
Per 1,000 of mean strength	18.30	11.27	30.58	25.53	7.89	18.43	18.55	16.64
Per 1,000 for previous year	91.55	48.48	24.12	53.41	23.09	27.99	28.05	26.89
Per 1,000 for preceding decade						6.69	6.47	7.98
Deaths from disease	328	34	601	963	277	1,241	1,169	72
Per 1,000 of mean strength	16.36	9.12	15.30	15.27	6.56	11.76	11.85	10.42
Per 1,000 for previous year	67.94	46.02	20.49	43.10	21.49	24.97	25.14	21.76
Per 1,000 for preceding decade						4.50	4.34	5.59
Deaths from injury	39	8	600	647	56	704	661	43
Per 1,000 of mean strength	1.94	2.15	15.28	10.26	1.33	6.67	6.70	6.22
Per 1,000 for previous year	23.61	2.46	3.63	10.31	1.60	3.02	2.91	5.13
Per 1,000 for preceding decade						2.19	2.13	2.39

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered.*

	Cavalry.						Artillery.						Infantry.					
Mean strength	2,750.						2,573.						93,744.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.36	....	....	....	....	1	0.39	....	....	1	0.39	33	0.35	....	....	3	0.03
Measles	106	38.55	....	....	1	0.36	44	17.10	....	....	....	....	6,058	64.62	7	0.07	57	.61
Smallpox	....	....	....	....	....	....	1	.39	....	....	1	.39	68	.73	....	....	15	.16
Vaccinia	241	87.63	....	....	....	....	158	61.41	....	....	....	....	3,501	37.35	1	.01	....	....
Influenza	8	2.91	....	....	....	....	173	67.24	....	....	....	....	2,471	26.36	1	.01	....	....
Dengue	15	5.45	....	....	....	....	3	1.17	....	....	....	....	175	1.87	....	....	2	.02
Mumps	20	7.27	....	....	....	....	27	10.49	....	....	....	....	1,811	19.32	2	.02	....	....
Diphtheria	....	....	....	....	....	....	....	....	....	....	....	....	42	.45	....	....	1	.01
Typhoid fever	538	195.63	1	0.36	53	19.27	162	62.96	....	....	18	7	15,794	168.48	23	.23	1,645	17.55
Yellow fever	27	9.82	....	....	2	.73	....	....	....	....	....	....	532	5.67	....	....	71	.76
Cerebro-spinal fever	6	2.18	....	....	3	1.09	1	.39	....	....	....	....	99	1.06	3	.03	62	.66
Malarial fever, intermittent	1,231	447.64	....	....	....	....	569	221.14	....	....	....	....	36,890	393.50	1	.01	....	....
Malarial fever, remittent	447	162.55	6	2.18	3	1.07	101	39.26	....	....	1	.39	16,404	174.98	16	.17	69	.74
Malarial fever, pernicious	....	....	....	....	....	....	1	.39	....	....	1	.39	201	2.14	5	.05	103	1.10
Malarial cachexia	41	14.91	1	.36	....	....	5	1.94	....	....	....	....	1,060	11.31	17	.18	16	.17
Fever, undetermined	188	68.36	....	....	....	....	25	9.72	....	....	....	....	2,721	29.02	....	....	1	.01
Erysipelas	....	....	....	....	....	....	2	.78	....	....	....	....	58	.62	....	....	....	....
Septicæmia and tetanus	....	....	....	....	....	....	....	....	....	....	....	....	18	.19	....	....	14	.15
Rheumatic fever	4	1.45	....	....	....	....	6	2.33	....	....	....	....	328	3.50	8	.09	....	....
Consumption	17	6.18	9	3.27	1	.36	5	1.94	2	.78	....	....	389	4.15	107	1.14	23	.25
Cancer	....	....	....	....	....	....	....	....	....	....	....	....	13	.14	1	.01	2	.02
Syphilis and results	32	11.64	5	1.82	....	....	35	13.60	2	.78	....	....	972	10.37	90	.96	1	.01
Gonorrhea and results	209	76.01	....	....	....	....	216	83.95	1	.39	....	....	4,768	50.86	44	.47	1	.01
Chancroid and results	41	14.91	....	....	....	....	42	16.32	....	....	....	....	1,978	21.10	10	.11	....	....
Infections, others	2	.73	....	....	....	....	1	.39	....	....	....	....	335	3.57	4	.04	....	....
Total infectious diseases	3,174	1,154.18	22	7.99	63	22.88	1,578	613.30	5	1.95	22	8.56	96,719	1,031.74	340	3.60	2,086	22.26
Anæmia	9	3.27	1	.36	....	....	8	3.11	....	....	....	....	324	3.46	3	.03	....	....
Nutrition, others	13	4.73	6	2.18	....	....	5	1.94	....	....	....	....	489	5.22	14	.15	3	.03
Total diseases of nutrition	22	8	7	2.54	....	....	13	5.05	....	....	....	....	813	8.68	17	.18	3	.03
Alcoholism	3	1.09	....	....	....	....	20	7.77	....	....	....	....	516	5.40	25	.27	14	.15
Brain and spinal cord	11	5.09	3	1.09	....	....	18	7	1	.39	....	....	537	5.73	66	.70	29	.31

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Cavalry.						Artillery.						Infantry.					
Mean strength	2,750.						2,573.						93,744.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Insanity	3	1.09	3	1.09	.....	......	2	0.78	2	0.78	.....	......	94	1	49	0.52	2	0.02
Meningitis	.....	......	.....	......	.....	......	1	.39	.....	......	1	.39	53	.57	.....	......	24	.26
Poisoning, narcotic	.....	......	.....	......	.....	......	3	1.17	2	.78	.....	......	45	.48	5	.05	3	.03
Nervous system, others	108	39.27	1	.36	.....	......	60	23.32	3	1.17	.....	......	2,324	24.79	30	.32	2	.02
Total diseases of the nervous system	128	46.54	7	2.54	.....	......	104	40.43	8	3.12	1	.39	3,569	37.97	175	1.86	74	.79
Poisoning, irritant	14	5.09	.....	......	1	.36	7	2.72	.....	......	.....	......	223	2.38	1	.01	8	.09
Tonsillitis, pharyngitis, and sore throat	51	18.55	.....	......	.....	......	90	34.98	.....	......	.....	......	2,838	30.27	1	.01	1	.01
Peritonitis	1	.36	.....	......	1	.36	1	.39	.....	......	.....	......	70	.75	.....	......	21	.22
Dyspepsia, colic, and constipation	379	137.82	.....	......	.....	......	214	83.17	.....	......	.....	......	8,571	91.43	21	.22	3	.03
Gastritis	111	40.36	.....	......	1	.36	39	15.16	1	.39	.....	......	2,049	21.86	7	.07	3	.03
Diarrheal diseases	2,341	851.27	5	1.82	2	.73	1,185	460.55	2	.78	.....	......	38,820	414.10	46	.49	111	1.18
Enteritis	109	39.63	.....	......	.....	......	43	16.71	.....	......	.....	......	2,397	25.57	4	.04	16	.17
Perityphlitis and appendicitis	8	2.91	.....	......	2	.73	6	2.33	1	.39	.....	......	236	2.52	9	.10	20	.21
Digestive system, others	155	56.37	4	1.45	1	.36	121	47.03	6	2.33	.....	......	4,539	48.42	37	.39	14	.15
Total diseases of the digestive system	3,169	1,152.36	9	3.27	8	2.90	1,706	663.04	10	3.89	.....	......	59,743	637.30	126	1.33	197	2.09
Heart, diseases of	20	7.27	7	2.55	1	.36	10	3.89	4	1.55	.....	......	312	3.33	60	.64	12	.13
Arteries and veins	6	2.18	2	.73	.....	......	7	2.72	.....	......	.....	......	162	1.73	20	.21	.....	......
Total diseases of the circulatory system	26	9.45	9	3.28	1	.36	17	6.61	4	1.55	.....	......	474	5.06	80	.85	12	.13
Bronchitis	162	58.91	5	1.82	.....	......	215	83.56	.....	......	.....	......	7,405	78.99	32	.34	1	.01
Pneumonia	16	5.82	1	.36	1	.36	16	6.22	.....	......	1	.39	749	7.99	9	.10	93	.99
Pleurisy	20	7.27	.....	......	.....	......	18	7	.....	......	.....	......	363	3.87	3	.03	5	.05
Respiratory system, others	73	26.55	2	.73	.....	......	146	56.75	2	.78	.....	......	4,074	43.46	16	.17	3	.03
Total diseases of the respiratory organs	271	98.55	8	2.91	1	.36	395	153.53	2	.78	1	.39	12,591	134.31	60	.64	102	1.08

Kidneys, diseases of	19	6.91	.....	.....	1	.36	11	4.28	.....	.....	.....	.....	193	2.06	16	.17	11	.12
Varicocele	18	6.54	4	1.45	.....	.....	2	.78	.....	.....	.....	.....	235	2.51	16	.17	.....	.....
Genito-urinary, others	32	11.64	2	.73	.....	.....	31	12.05	1	.39	.....	.....	873	9.31	16	.17	2	.02
Total diseases of the genito-urinary system	69	25.09	6	2.18	1	.36	44	17.11	1	.39	.....	.....	1,301	13.88	48	.51	13	.14
Adenitis	14	5.09	1	.36	.....	.....	18	7	1	.39	.....	.....	313	3.34	3	.03	.....	.....
Lymphatic system, others	2	.73	.....	.....	.....	.....	3	1.17	.....	.....	.....	.....	89	.95	2	.02	.....	.....
Total diseases of the lymphatic system	16	5.82	1	.36	.....	.....	21	8.17	1	.39	.....	.....	402	4.29	5	.05	.....	.....
Rheumatism, muscular	150	54.55	2	.73	.....	.....	173	67.24	4	1.55	.....	.....	4,957	52.87	57	.61	.....	.....
Osteitis and periostitis	3	1.09	.....	.....	.....	.....	7	2.72	.....	.....	.....	.....	105	1.12	3	.03	.....	.....
Arthritis and synovitis	14	5.09	.....	.....	.....	.....	22	8.55	1	.39	.....	.....	536	5.72	17	.18	.....	.....
Rheumatism, chronic articular	11	4	1	.36	.....	.....	12	4.66	2	.78	.....	.....	517	5.51	43	.46	1	.01
Muscles, bones, and joints, others	5	1.82	1	.36	.....	.....	8	3.11	2	.78	.....	.....	166	1.77	28	.30	.....	.....
Total diseases of the muscles, bones, and joints	183	66.55	4	1.45	.....	.....	222	86.28	9	3.50	.....	.....	6,281	66.99	148	1.58	1	.01
Total diseases of the integumentary system, all	251	91.28	1	.36	.....	.....	204	79.28	.....	.....	.....	.....	4,153	44.30	17	.18	3	.03
Total diseases of the eye	46	16.73	1	.36	.....	.....	27	10.49	.....	.....	.....	.....	852	9.09	30	.32	.....	.....
Total diseases of the ear	16	5.82	.....	.....	.....	.....	39	15.16	1	.39	.....	.....	667	7.11	28	.30	2	.02
Total diseases of the nose	.....	.....	.....	.....	.....	.....	.....	.....	2	.78	.....	.....	51	.54	3	.03	.....	.....
Total unclassified	48	17.45	.....	.....	1	.36	86	33.43	.....	.....	1	.39	2,094	22.34	53	.57	36	.38
Total for diseases	7,419	2,697.82	75	27.28	75	27.28	4,456	1,731.88	43	16.71	25	9.72	189,710	2,023.70	1,130	12.05	25.29	26.98
Drowning	.....	.....	.....	.....	.....	.....	1	.39	.....	.....	.....	.....	.....	.....	.....	.....	13	.14
Exhaustion from exposure and fatigue	41	14.91	.....	.....	.....	.....	21	8.16	.....	.....	.....	.....	1,018	10.86	8	.09	3	.03
Heat stroke	10	3.64	.....	.....	.....	.....	2	.78	.....	.....	.....	.....	273	2.91	9	.10	1	.01
Lightning	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22	.23	.....	.....	2	.02
Venomous bites, stings, and wounds	13	4.73	.....	.....	.....	.....	28	10.88	.....	.....	.....	.....	266	2.84	1	.01	.....	.....
Abrasions, blisters, burns, and scalds	28	10.18	.....	.....	.....	.....	46	17.88	.....	.....	.....	.....	1,067	11.38	1	.01	.....	.....
Compression and concussion of brain	5	1.82	.....	.....	1	.36	2	.78	.....	.....	.....	.....	50	.53	2	.02	1	.01
Contusions and sprains	343	124.73	9	3.27	.....	.....	297	115.43	.....	.....	.....	.....	2,889	30.82	12	.13	.....	.....
Dislocations	10	3.64	2	.73	1	.36	5	1.94	.....	.....	.....	.....	154	1.64	7	.07	.....	.....
Fractures (not shot)	44	16	3	1.09	3	1.09	27	10.49	1	.39	.....	.....	419	4.47	10	.11	10	.11
Herniæ	26	9.45	9	3.27	.....	.....	22	8.55	6	2.33	.....	.....	709	7.56	94	1	.....	.....
Wounds, contused, lacerated, and punctured	98	35.64	.....	.....	1	.36	64	24.87	.....	.....	.....	.....	913	9.74	4	.04	.....	.....
Wounds, incised	29	10.55	.....	.....	1	.36	30	11.66	.....	.....	.....	.....	611	6.52	1	.01	6	.06
Wounds, gunshot	118	42.91	.....	.....	24	8.73	20	7.77	.....	.....	3	1.17	459	4.90	18	.19	91	.97
Secondary results of injury	6	2.18	1	.36	.....	.....	3	1.17	1	.39	.....	.....	69	.74	15	.16	2	.02
Other injuries	28	10.18	2	.73	3	1.09	24	9.33	.....	.....	.....	.....	381	4.06	9	.10	17	.18
Total for injuries	799	290.55	26	9.45	34	12.36	592	230.08	8	3.11	3	1.17	9,300	99.20	191	2.04	146	1.56
Total for diseases and injuries	8,218	2,988.36	101	36.73	109	39.64	5,048	1,961.91	51	19.82	28	10.88	199,010	2,122.91	1,321	14.09	2,675	28.54

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Engineers.						Signal Corps.						Army.					
Mean strength	1,504.						589.						101,160.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													35	0.35			4	0.04
Measles	6	3.99					3	5.09					6,217	61.46	7	0.07	58	.57
Smallpox							4	6.79					73	.72			16	.16
Vaccinia	319	212.10					15	25.47					4,234	41.85	1	.01		
Influenza	77	51.20					3	5.09					2,732	27.01	1	.01		
Dengue	20	13.30											213	2.11			2	.02
Mumps	5	3.32											1,863	18.42	2	.02		
Diphtheria													42	.42			1	.01
Typhoid fever	224	148.94			17	11.30	78	132.43	1	1.70	5	8.49	16,796	166.03	25	.25	1,738	17.18
Yellow fever							6	10.19			1	1.70	565	5.58			74	.73
Cerebro-spinal fever							2	3.40					108	1.07	3	.03	65	.64
Malarial fever, intermittent	462	307.18					158	268.25					39,310	388.59	1	.01		
Malarial fever, remittent	330	219.42			1	.66	100	169.78					17,382	171.82	22	.22	74	.73
Malarial fever, pernicious	3	1.99			1	.66	14	23.77			3	5.09	219	2.16	5	.05	108	1.07
Malarial cachexia	2	1.33					4	6.79	1	1.70			1,112	10.99	19	.19	16	.16
Fever, undetermined	75	49.87					2	3.40					3,011	29.76			1	.01
Erysipelas	7	4.65											67	.66				
Septicæmia and tetanus													18	.18			14	.14
Rheumatic fever	6	3.99					1	1.70					345	3.41	8	.08		
Consumption	7	4.65											418	4.13	118	1.17	24	.24
Cancer													13	.13	1	.01	2	.02
Syphilis and results	14	9.31					4	6.79					1,057	10.45	97	.96	1	.01
Gonorrhea and results	45	29.92	1	0.66			19	32.26					5,257	51.97	46	.45	1	.01
Chancroid and results	15	9.97					7	11.88					2,083	20.59	10	.10		
Infections, others													338	3.34	4	.04		
Total infectious diseases	1,617	1,075.13	1	.66	19	12.62	420	713.08	2	3.40	9	15.28	103,508	1,023.20	370	3.67	2,199	21.74
Anæmia	10	6.65					9	15.28					360	3.56	4	.04		
Nutrition, others	11	7.31					1	1.70					519	5.13	20	.20	3	.03
Total diseases of nutrition	21	13.96					10	16.98					879	8.69	24	.24	3	.03

Alcoholism	25	16.62					8	13.58					572	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Brain and spinal cord	6	3.99	1	.66	1	.66	7	11.88	1	1.70			582	5.76	72	.71	30	.30
Insanity	4	2.66	1	.66									103	1.02	55	.54	2	.02
Meningitis													54	.53			25	.25
Poisoning, narcotic													48	.47	7	.07	3	.03
Nervous system, others	52	34.58					7	11.88					2,551	25.22	34	.34	2	.02
Total diseases of the nervous system	87	57.85	2	1.32	1	.66	22	37.34	1	1.70			3,910	38.64	193	1.91	76	.76
Poisoning, irritant							13	22.07					244	2.41	1	.01	9	.09
Tonsillitis, pharyngitis, and sore throat	22	14.63	1	.66									3,014	29.79	2	.02	1	.01
Peritonitis	26	17.29											98	.97			22	.22
Dyspepsia, colic, and constipation	193	128.32	2	1.33			53	89.98					9,410	93.02	23	.23	3	.03
Gastritis	44	29.26	1	.66			7	11.88					2,250	22.24	9	.09	4	.04
Diarrheal diseases	733	487.37	1	.66	1	.66	191	324.28					43,270	427.74	54	.53	114	1.13
Enteritis	7	4.65					10	16.98					2,566	25.36	4	.04	16	.16
Perityphlitis and appendicitis	5	3.32					1	1.70					256	2.53	10	.10	22	.22
Digestive system, others	198	131.65			1	.66	23	39.05					5,036	49.78	47	.46	16	.16
Total diseases of the digestive system	1,228	816.49	5	3.31	2	1.32	298	505.94					66,144	653.84	150	1.48	207	2.06
Heart, disease of	9	5.98	1	.66			5	8.49	2	3.40			356	3.52	74	.73	13	.13
Arteries and veins	7	4.65	1	.66			1	1.70					183	1.81	23	.23		
Total diseases of the circulatory system	16	10.63	2	1.32			6	10.19	2	3.40			539	5.33	97	.96	13	.13
Bronchitis	133	88.44					20	33.96					7,935	78.44	37	.37	1	.01
Pneumonia	13	8.64			2	1.33							794	7.85	10	.10	97	.96
Pleurisy	4	2.66	1	.66	1	.66	5	8.49					410	4.05	4	.04	6	.06
Respiratory system, others	97	64.50					29	49.23					4,419	43.68	20	.20	3	.03
Total diseases of the respiratory organs	247	164.24	1	.66	3	1.99	54	91.68					13,558	134.02	71	.71	107	1.06
Kidneys, diseases of	4	2.66			1	.66							227	2.24	16	.16	13	.13
Varicocele	9	5.98											264	2.61	20	.20		
Genito-urinary, others	17	11.30					5	8.49					958	9.47	19	.19	2	.02
Total diseases of the genito-urinary system	30	19.94			1	.66	5	8.49					1,449	14.32	55	.55	15	.15
Adenitis							4	6.79					349	3.45	5	.05		
Lymphatic system, others	9	5.98					1	1.70					104	1.03	2	.02		
Total diseases of the lymphatic system	9	5.98					5	8.49					453	4.48	7	.07		
Rheumatism, muscular	192	127.66	1	.66			20	33.96					5,492	54.29	64	.63		
Osteitis and periostitis	1	.66											116	1.15	3	.03		
Arthritis and synovitis	9	5.98					5	8.49					586	5.79	18	.18		
Rheumatism, chronic articular	11	7.31	2	1.33			2	3.40	1	1.70			553	5.47	49	.48	1	.01
Muscles, bones, and joints, others	9	5.98	1	.66			2	3.40					190	1.88	32	.30		
Total diseases of the muscles, bones, and joints	222	147.61	4	2.65			29	49.25	1	1.70			6,937	68.58	166	1.62	1	.01

TABLE IV.—*Volunteer Army, 1898.—Admission to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	4,535.						3,763.						7,004.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total dieases of the integumentary system, all	63	41.89					20	33.96					4,691	46.37	18	0.18	3	0.03
Total diseases of the eye	25	16.62	4	2.66			5	8.49	1	1.70			955	9.44	36	.36		
Total diseases of the ear	22	14.63	1	.66									744	7.35	30	.30	2	.02
Total diseases of the nose	1	.66					1	1.70					53	.52	5	.05		
Total unclassified	27	17.95					8	13.58					2,263	22.37	53	.52	38	.38
Total for diseases	3,615	2,403.59	20	13.30	26	17.29	883	1,499.15	7	11.88	9	15.28	206,083	2,037.20	1,275	12.60	2,664	26.33
Drowning													1	.01			13	.13
Exhaustion from exposure and fatigue	17	11.30					5	8.49			1	1.70	1,102	10.89	8	.08	4	.04
Heat stroke	4	2.66					6	10.19					295	2.92	9	.09	1	.01
Lightning													22	.22			2	.02
Venomous bites, stings, and wounds	12	7.98											319	3.15	1	.01		
Abrasions, blisters, burns, and scalds	26	17.29					6	10.19					1,173	11.60	1	.01		
Compression and concussion of brain													57	.56	2	.02	2	.02
Contusions and sprains	73	48.54					23	39.05					3,625	35.84	21	.21		
Dislocations	4	2.66					3	5.09					176	1.74	9	.09	1	.01
Fractures (not shot)	12	7.98					4	6.79	1	1.70			506	5.00	15	.15	13	.13
Herniæ	33	21.94	4	2.66	1	.66	5	8.49	1	1.70			795	7.86	114	1.13	1	.01
Wounds, contused, lacerated, and punctured	22	14.63					3	5.09					1,100	10.87	4	.04	1	.01
Wounds, incised	19	12.63					3	5.09					692	6.84	1	.01	7	.07
Wounds, gunshot	2	1.33					1	1.70					600	5.93	18	.18	118	1.17
Secondary results of injury	1	.66											79	.78	17	.17	2	.02
Other injuries	10	6.65			1	.66	4	6.79			1	1.70	447	4.42	11	.11	22	.22
Total for injuries	235	156.25	4	2.66	2	1.33	63	106.96	2	3.40	2	3.40	10,989	108.63	231	2.28	187	1.85
Total for diseases and injuries	3,850	2,559.84	24	15.96	28	18.62	946	1,606.11	9	15.28	11	18.68	217,072	2,145.83	1,506	14.89	2,851	28.18

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	4,535.						3,763.						7,004.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	2	0.44	....	....	1	0.22	1	0.27	....	....	....	....	....	....	....	....	....	....
Measles	149	32.86	....	....	1	.22	96	25.51	....	....	1	0.27	226	32.27	....	....	2	0.29
Smallpox	1	.22	....	....	....	....	5	1.33	....	....	....	....	59	8.42	....	....	15	2.14
Vaccinia	30	6.62	....	....	....	....	2	.53	....	....	....	....	271	38.69	....	....	....	....
Influenza	1	.22	....	....	....	....	7	1.86	....	....	....	....	70	9.99	....	....	....	....
Dengue	40	8.82	....	....	2	.44	11	2.92	....	....	....	....	4	.57	....	....	....	....
Mumps	1	.22	....	....	....	....	13	3.45	....	....	....	....	340	48.54	....	....	....	....
Diphtheria	8	1.76	....	....	....	....	....	....	....	....	....	....	4	.57	....	....	....	....
Typhoid fever	433	95.48	....	....	100	22.05	1,214	322.62	....	....	153	40.66	632	90.23	7	1.00	65	9.28
Yellow fever	552	121.72	....	....	72	15.88	2	.53	....	....	....	....	....	....	....	....	....	....
Cerebro-spinal fever	9	1.98	....	....	9	1.98	....	....	....	....	....	....	3	.43	1	.14	1	.14
Malarial fever, intermittent	8,954	1,974.42	1	0.22	....	....	1,449	385.06	....	....	....	....	1,158	165.33	....	....	....	....
Malarial fever, remittent	2,240	493.94	....	....	27	5.95	1,177	312.78	3	0.80	7	1.86	1,787	255.14	1	.14	8	1.14
Malarial fever, pernicious	77	16.98	....	....	37	8.16	6	1.59	....	....	4	1.06	4	.57	....	....	2	.29
Malarial cachexia	316	69.68	1	.22	3	.66	10	2.66	....	....	....	....	10	1.43	....	....	....	....
Fever, undetermined	196	43.22	....	....	....	....	195	51.82	....	....	....	....	411	58.68	....	....	....	....
Erysipelas	....	....	....	....	....	....	2	.53	....	....	....	....	5	.71	....	....	....	....
Septicæmia and tetanus	1	.22	....	....	....	....	....	....	....	....	....	....	3	.43	....	....	4	.57
Rheumatic fever	18	3.97	....	....	2	.44	9	2.39	....	....	....	....	22	3.14	1	.14	....	....
Consumption	36	7.94	4	.88	....	....	15	3.99	4	1.06	3	.80	46	6.57	12	1.71	5	.71
Cancer	1	.22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Syphilis and results	51	11.25	4	.88	....	....	26	6.91	3	.80	....	....	45	6.42	....	....	....	....
Gonorrhea and results	177	39.03	1	.22	....	....	116	30.83	....	....	....	....	539	76.96	....	....	....	....
Chancroid and results	117	25.80	2	.44	....	....	54	14.35	....	....	....	....	512	73.10	....	....	....	....
Infections, others	1	22	2	.44	....	....	6	1.59	....	....	....	....	17	2.43	....	....	....	....
Total infectious diseases	13,411	2,957.22	15	3.30	254	56.00	4,416	1,173.52	10	2.66	168	44.65	6,168	880.62	22	3.13	102	14.56
Anæmia	7	1.54	....	....	....	....	12	3.19	1	.27	....	....	44	6.28	1	.14	....	....
Nutrition, others	246	54.25	1	.22	1	.22	15	3.99	....	....	....	....	4	.57	....	....	1	.14
Total diseases of nutrition	253	55.79	1	.22	1	.22	27	7.18	1	.27	....	....	48	6.85	1	.14	1	.14

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Engineers.						Signal corps.						Army.					
Mean strength	1,504.						589.						101,160.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	103	22.71	.....	.....	4	.88	11	2.92	.....	.....	.....	.....	33	4.71	.....	.....	.....	.....
Brain and spinal cord	18	3.97	3	.66	1	.22	16	4.25	1	.27	6	1.59	23	3.28	8	1.14	2	.29
Insanity	6	1.32	.....	.....	.....	.....	2	.53	.....	.....	.....	.....	6	.86	1	.14	.....	.....
Meningitis	2	.44	.....	.....	2	.44	2	.53	3	.80	2	.53	9	1.28	.....	.....	3	.43
Poisoning, narcotic	5	1.10	.....	.....	.....	.....	8	2.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nervous system, others	104	22.93	1	.22	.....	.....	46	12.22	.....	.....	.....	.....	132	18.85	4	.57	.....	.....
Total diseases of the nervous system	238	52.47	4	.88	7	1.54	85	22.58	4	1.07	8	2.12	203	28.98	13	1.85	5	.72
Poisoning, irritant	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.27	8	1.14	.....	.....	1	.14
Tonsillitis, pharyngitis, and sore throat	50	11.03	.....	.....	.....	.....	51	13.55	.....	.....	.....	.....	226	32.27	.....	.....	.....	.....
Peritonitis	3	.66	.....	.....	1	.22	2	.53	.....	.....	.....	.....	28	4.00	.....	.....	.....	.....
Dyspepsia, colic, and constipation	212	46.75	.....	.....	.....	.....	104	27.64	.....	.....	.....	.....	329	46.97	.....	.....	.....	.....
Gastritis	60	13.23	.....	.....	.....	.....	99	26.31	.....	.....	1	.27	149	21.27	2	.29	1	.14
Diarrheal diseases	1,599	352.59	1	.22	39	8.60	2,054	545.84	.....	.....	4	1.06	2,705	386.21	17	2.43	20	2.86
Enteritis	88	19.41	.....	.....	3	.66	120	31.89	.....	.....	.....	.....	87	12.42	2	.29	2	.29
Perityphlitis and appendicitis	11	2.43	.....	.....	2	.44	12	3.19	.....	.....	.....	.....	34	4.85	.....	.....	2	.29
Digestive system, others	154	33.96	2	.44	2	.44	118	31.36	.....	.....	1	.27	119	16.99	1	.14	.....	.....
Total diseases of the digestive system	2,177	480.06	3	.66	47	10.36	2,560	680.31	.....	.....	7	1.87	3,685	526.12	22	3.15	26	3.72
Heart, diseases of	22	4.85	3	.66	2	.44	15	3.99	1	.27	1	.27	29	4.14	10	1.43	2	.29
Arteries and veins	8	1.76	1	.22	.....	.....	13	3.45	.....	.....	.....	.....	20	2.86	1	.14	.....	.....
Total diseases of the circulatory system	30	6.61	4	.88	2	.44	28	7.44	1	.27	1	.27	49	7.00	11	1.57	2	.29
Bronchitis	129	28.45	.....	.....	.....	.....	110	29.23	1	.27	.....	.....	345	49.26	7	1.00	.....	.....
Pneumonia	20	4.41	.....	.....	3	.66	9	2.39	.....	.....	1	.27	48	6.85	4	.57	8	1.14
Pleurisy	9	1.98	.....	.....	.....	.....	6	1.59	.....	.....	.....	.....	17	2.43	.....	.....	.....	.....
Respiratory system, others	41	9.04	1	.22	1	.22	11	2.92	.....	.....	.....	.....	135	19.27	1	.14	.....	.....
Total diseases of the respiratory organs	199	43.88	1	.22	4	.88	136	36.13	1	.27	1	.27	545	77.81	12	1.71	8	1.14

Kidneys, diseases of	13	2.87	.....	......	1	.22	10	2.66	.....	......	1	.27	15	2.14	.....	......	1	.14
Varicocele	7	1.54	.....	......	.....	......	6	1.59	.....	......	.....	......	34	4.85	1	.14	.....	......
Genito-urinary, others	40	8.82	1	.22	.....	......	34	9.04	.....	......	.....	......	56	7.99	.....	......	.....	......
Total diseases of the genito-urinary system	60	13.23	1	.22	1	.22	50	13.29	.....	......	1	.27	105	14.98	1	.14	1	.14
Adenitis	13	2.87	.....	......	.....	......	19	5.05	.....	......	.....	......	39	5.57	.....	......	.....	......
Lymphatic system, others	7	1.54	.....	......	.....	......	2	.53	.....	......	.....	......	14	2.00	.....	......	.....	......
Total diseases of the lymphatic system	20	4.41	.....	......	.....	......	21	5.58	.....	......	.....	......	53	7.57	.....	......	.....	......
Rheumatism, muscular	223	49.17	1	.22	.....	......	124	32.95	.....	......	.....	......	228	32.55	4	.57	.....	......
Osteitis and periostitis	1	.22	.....	......	.....	......	1	.27	.....	......	.....	......	11	1.57	.....	......	.....	......
Arthritis and synovitis	19	4.19	.....	......	.....	......	21	5.58	.....	......	.....	......	58	8.28	5	.71	.....	......
Rheumatism, chronic articular	36	7.94	1	.22	.....	......	10	2.66	.....	......	.....	......	92	13.13	15	2.14	1	.14
Muscles, bones, and joints, others	3	.66	1	.22	.....	......	7	1.86	.....	......	.....	......	10	1.43	.....	......	.....	......
Total diseases of the muscles, bones, and joints	282	62.18	3	.66	.....	......	163	43.32	.....	......	.....	......	399	56.96	24	3.42	1	.14
Total diseases of the integumentary system, all	151	33.30	3	.66	.....	......	105	27.90	.....	......	.....	......	596	85.09	.....	......	3	.43
Total diseases of the eye	18	3.97	1	.22	.....	......	11	2.92	.....	......	.....	......	65	9.28	8	1.14	.....	......
Total diseases of the ear	8	1.76	.....	......	.....	......	20	5.31	.....	......	.....	......	113	16.13	3	.43	.....	......
Total diseases of the nose	3	.66	1	.22	.....	......	.....	......	.....	......	.....	......	3	.43	.....	......	.....	......
Total unclassified	924	203.75	.....	......	18	3.97	126	33.48	.....	......	.....	......	13	1.86	1	.14	.....	......
Total for diseases	17,774	3,919.29	37	8.16	334	73.65	7,748	2,058.99	17	4.52	186	49.43	12,045	1,719.73	118	16.85	149	21.27
Drowning	.....	......	.....	......	1	.22	.....	......	.....	......	.....	......	1	.14	.....	......	1	.14
Exhaustion from exposure and fatigue	87	19.19	.....	......	1	.22	161	42.78	.....	......	1	.27	19	2.71	2	.29	.....	......
Heat stroke	73	16.10	3	.66	.....	......	14	3.72	.....	......	.....	......	7	1.00	.....	......	.....	......
Venomous bites, stings, and wounds	6	1.32	.....	......	.....	......	16	4.25	.....	......	.....	......	71	10.14	.....	......	.....	......
Abrasions, blisters, burns, and scalds	18	3.97	.....	......	.....	......	34	9.04	.....	......	.....	......	110	15.70	.....	......	.....	......
Compression and concussion of brain	.....	......	.....	......	.....	......	3	.80	.....	......	.....	......	6	.86	.....	......	.....	......
Contusions and sprains	80	17.64	.....	......	.....	......	59	15.68	.....	......	.....	......	198	28.27	3	.43	.....	......
Dislocations	7	1.54	.....	......	.....	......	6	1.59	.....	......	.....	......	14	2.00	.....	......	.....	......
Fractures (not shot)	21	4.63	.....	......	.....	......	17	4.52	1	.27	1	.27	31	4.43	.....	......	1	.14
Herniæ	36	7.94	4	.88	.....	......	47	12.49	1	.27	1	.27	55	7.85	6	.86	.....	......
Wounds, contused, lacerated, and punctured	42	9.26	2	.44	.....	......	20	5.31	.....	......	.....	......	93	13.28	.....	......	.....	......
Wounds, incised	27	5.95	.....	......	.....	......	13	3.45	.....	......	.....	......	50	7.14	.....	......	1	.14
Wounds, gunshot	264	58.22	.....	......	54	11.91	34	9.04	.....	......	7	1.86	99	14.14	8	1.14	20	2.86
Secondary results of injury	1	.22	.....	......	.....	......	.....	......	.....	......	.....	......	6	.86	.....	......	.....	......
Other injuries	23	5.07	.....	......	.....	......	16	4.25	.....	......	.....	......	27	3.85	.....	......	1	.14
Total for injuries	685	151.05	9	1.98	56	12.35	440	116.93	2	.53	10	2.66	787	112.36	19	2.71	24	3.43
Total for diseases and injuries	18,459	4,070.34	46	10.14	390	86.00	8,188	2,175.92	19	5.05	196	52.09	12,832	1,832.10	137	19.56	173	24.70

TABLE IV.—*Volunteer Army, 1898—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Total islands.						Total United States.					
Mean strength	15,302.						85,269.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	3	0.20	......	......	1	0.07	32	0.38	......	......	3	0.04
Measles	471	30.78	......	......	3	.20	5,743	67.36	7	0.08	55	.65
Smallpox	65	4.25	......	......	16	1.05	4	.05	......	......	......	......
Vaccinia	303	19.80	......	......	......	......	3,916	45.93	1	.01	......	......
Influenza	78	5.10	......	......	......	......	2,651	31.09	1	.01	......	......
Dengue	55	3.59	......	......	2	.13	158	1.85	......	......	......	......
Mumps	354	23.13	......	......	......	......	1,509	17.70	2	.02	......	......
Diphtheria	12	.78	......	......	......	......	30	.35	......	......	1	.01
Typhoid fever	2,279	148.94	7	0.46	318	20.78	14,439	169.34	17	.20	1,415	16.59
Yellow fever	554	36.20	......	......	72	4.71	5	.06	......	......	1	.01
Cerebro-spinal fever	12	.78	1	.07	10	.65	94	1.10	2	.02	55	.65
Malarial fever, intermittent	11,561	755.52	1	.07	......	......	27,591	323.57	......	......	......	......
Malarial fever, remittent	5,204	340.09	4	.26	42	2.74	12,078	141.65	18	.21	32	.38
Malarial fever, pernicious	87	5.69	......	......	43	2.81	118	1.38	5	.06	62	.73
Malarial cachexia	336	21.96	1	.07	3	.20	772	9.05	17	.20	13	.15
Fever, undetermined	802	52.41	......	......	......	......	2,207	25.88	......	......	1	.01
Erysipelas	7	.46	......	......	......	......	60	.70	......	......	......	......
Septicæmia and tetanus	4	.26	......	......	4	.26	14	.16	......	......	10	.12
Rheumatic fever	49	3.20	1	.07	2	.13	295	3.46	7	.08	......	......
Consumption	97	6.34	20	1.31	8	.52	321	3.76	98	1.15	14	.16
Cancer	1	.07	......	......	......	......	12	.14	1	.01	2	.02
Syphilis and results	122	7.97	7	.46	......	......	931	10.92	90	1.06	1	.01
Gonorrhea and results	832	54.37	1	.07	......	......	4,406	51.67	45	.53	1	.01
Chancroid and results	683	44.63	2	.13	......	......	1,393	16.34	8	.09	......	......
Infections, others	24	1.57	2	13	......	......	314	3.68	2	.02	......	......
Total infectious diseases	23,995	1,568.09	47	3.07	524	34.25	79,093	927.57	321	3.75	1,666	19.54
Anæmia	63	4.12	2	.13	......	......	288	3.38	2	.02	......	......
Nutrition, others	265	17.32	1	.07	2	.13	253	2.97	19	.22	1	.01
Total diseases of nutrition	328	21.44	3	.20	2	.13	541	6.35	21	.24	1	.01

Alcoholism	147	9.61	....	....	4	.26	417	4.89	25	.29	10	.12
Brain and spinal cord	57	3.72	12	.78	9	.59	518	6.08	59	.69	21	.25
Insanity	14	.91	1	.07	....	....	89	1.04	51	.60	2	.02
Meningitis	13	.85	3	.20	7	.46	41	.48	....	....	18	.21
Poisoning, narcotic	13	.85	....	....	....	....	35	.41	7	.08	3	.04
Nervous system, others	282	18.43	5	.33	....	....	2,262	26.52	29	.34	2	.02
Total diseases of the nervous system	526	34.38	21	1.37	20	1.31	3,362	39.42	171	2.00	56	.66
Poisoning, irritant	8	.52	....	....	2	.13	236	2.77	1	.01	7	.08
Tonsillitis, pharyngitis, and sore throat	327	21.37	....	....	....	....	2,674	31.36	2	.02	1	.01
Peritonitis	33	2.16	....	....	1	.07	65	.76	....	....	21	.25
Dyspepsia, colic, and constipation	645	42.15	....	....	....	....	8,712	102.17	23	.27	3	.04
Gastritis	308	20.13	2	.13	2	.13	1,935	22.69	7	.08	2	.02
Diarrheal diseases	6,358	415.50	18	1.18	63	4.12	36,721	430.65	36	.42	51	.60
Enteritis	295	19.28	2	.13	5	.33	2,261	26.52	2	.02	11	.13
Perityphlitis and appendicitis	57	3.72	....	....	4	.26	198	2.32	10	.12	18	.21
Digestive system, others	391	25.55	3	.20	3	.20	4,622	54.21	44	.54	13	.15
Total diseases of the digestive system	8,422	550.39	25	1.63	80	5.23	57,424	673.45	125	1.48	127	1.49
Heart, diseases of	66	4.31	14	.91	5	.33	285	3.34	58	.68	8	.09
Arteries and veins	41	2.68	2	.13	....	....	141	1.65	21	.25	....	....
Total diseases of the circulatory system	107	6.99	16	1.05	5	.33	426	4.99	79	.93	8	.09
Bronchitis	581	38.16	8	.52	....	....	7,331	85.98	29	.34	1	.01
Pneumonia	77	5.03	4	.26	12	.78	717	8.41	6	.07	85	1.00
Pleurisy	32	2.09	....	....	....	....	373	4.37	4	.05	6	.07
Respiratory system, others	187	12.22	2	.13	1	.07	4,203	49.29	18	.21	2	.02
Total diseases of the respiratory organs	880	57.51	14	.91	13	.85	12,624	148.05	57	.67	94	1.10
Kidneys, diseases of	38	2.48	....	....	3	.20	189	2.22	16	.19	10	.12
Varicocele	47	3.07	1	.07	....	....	217	2.54	19	.22	....	....
Genito-urinary, others	130	8.50	1	.07	....	....	823	9.65	18	.21	2	.02
Total diseases of the genito-urinary system	215	14.05	2	.13	3	.20	1,229	14.41	53	.62	12	.14
Adenitis	71	4.64	....	....	....	....	274	3.21	5	.06	....	....
Lymphatic system, others	23	1.50	....	....	....	....	80	.94	2	.02	....	....
Total diseases of the lymphatic system	94	6.14	....	....	....	....	354	4.15	7	.08	....	....
Rheumatism, muscular	575	37.58	5	.33	....	....	4,897	57.43	59	.69	....	....
Osteitis and periostitis	13	.85	....	....	....	....	103	1.21	3	.04	....	....
Arthritis and synovitis	98	6.40	5	.33	....	....	483	5.66	13	.15	....	....
Rheumatism, chronic articular	138	9.02	16	1.05	1	.07	413	4.84	32	.38	....	....
Muscles, bones, and joints, others	20	1.31	1	.07	....	....	168	1.97	31	.36	....	....
Total diseases of the muscles, bones, and joints	844	55.16	27	1.76	1	.07	6,064	71.11	138	1.62	....	....

TABLE IV.—*Volunteer Army, 1898—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Total islands.						Total United States.					
Mean strength	15,302.						85,269.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	852	55.68	3	0.20	3	0.20	3,819	44.79	15	0.18		
Total diseases of the eye	94	6.14	9	59			856	10.04	26	.30		
Total diseases of the ear	141	9.21	3	.20			603	7.07	27	.32	2	0.02
Total diseases of the nose	6	.39	1	.07			46	.54	4	.05		
Total unclassified	1,063	69.46	1	.07	18	1.18	1,192	13.98	52	.61	20	.23
Total for diseases	37,567	2,455.04	172	11.24	669	43.72	167,633	1,965.93	1,096	12.85	1,986	23.29
Drowning	1	.07			2	.13					11	.13
Exhaustion from exposure and fatigue	267	17.45	2	.13	2	.13	830	9.73	6	.07	1	.01
Heat stroke	94	6.14	3	.20			195	2.29	6	.07	1	.01
Lightning							22	.26			2	.02
Venomous bites, stings, and wounds	93	6.08					226	2.65	1	.01		
Abrasions, blisters, burns, and scalds	162	10.59					1,005	11.79	1	.01		
Compression and concussion of brain	9	.59					48	.56	2	.02	2	.02
Contusions and sprains	337	22.02	3	20			3,265	38.29	18	.21		
Dislocations	27	1.76					146	1.71	9	.11	1	.01
Fractures (not shot)	69	4.51	1	.07	2	.13	433	5.08	13	.15	11	.13
Herniæ	138	9.02	11	.72	1	.07	652	7.65	102	1.20		
Wounds, contused, lacerated, and punctured	155	10.13	2	.13			942	11.05	2	.02	1	.01
Wounds, incised	90	5.88			1	.07	599	7.02	1	.01	6	.07
Wounds, gunshot	397	25.94	8	.52	81	5.29	202	2.37	10	.12	37	.43
Secondary results of injury	7	.46					72	.84	17	.20	2	.02
Other injuries	66	4.31			1	.07	377	4.42	11	.13	20	.23
Total for injuries	1,912	124.94	30	1.96	90	5.88	9,014	105.71	199	2.33	95	1.11
Total for diseases and injuries	39,479	2,579.99	202	13.20	759	49.60	176,647	2,071.65	1,295	15.19	2,081	24.41

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered.*

	Cavalry.						Artillery.						Infantry.					
Mean strength	351.						612.						39,148.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													14	0.36				
Measles	1	2.85					8	13.07					1,204	30.75			8	0.20
Smallpox							2	3.27					208	5.31			59	1.51
Vaccinia	20	56.98					17	27.78					3,416	87.25			1	.03
Influenza	1	2.85					15	24.51					3,112	79.49			4	.10
Dengue	224	638.18											318	8.12				
Mumps	2	5.70					8	13.07					714	18.24				
Diphtheria													30	.77			4	.10
Typhoid fever	7	19.94			2	5.70	6	9.80			2	3.27	657	16.78	12	0.31	74	1.89
Yellow fever													3	.08				
Cerebro-spinal fever													11	.28			8	.20
Malarial fever, intermittent	776	2,210.83	1	2.85			66	107.85					10,689	273.04	2	.05		
Malarial fever, remittent	95	270.69					292	477.12					6,980	178.30	5	.13	6	.15
Malarial fever, pernicious	1	2.85											52	1.33			29	.74
Malarial cachexia	14	39.89					1	1.63					351	8.97	9	.23	8	.20
Fever, undetermined	22	62.68					7	11.44					846	21.61				
Erysipelas							1	1.63			1	1.63	21	.54			1	.03
Septicæmia and tetanus							1	1.63					2	.05			1	.03
Rheumatic fever	2	5.70					3	4.90					123	3.14	3	.08		
Consumption	2	5.70	1	2.85					2	3.27			112	2.86	38	.97	16	.41
Cancer	1	2.85											4	.10			1	.03
Syphilis and results	8	22.79					15	24.51	2	3.27			491	12.54	50	1.28		
Gonorrhea and results	28	79.77					51	83.33					2,325	59.39	15	.38		
Chancroid and results	31	88.31					45	73.53					1,508	38.52	2	.05		
Infections, others													79	2.02	2	.05	3	.08
Total infectious diseases	1,235	3,518.56	2	5.70	2	5.70	538	879.07	4	6.54	3	4.90	33,270	849.85	138	3.53	223	5.70
Anæmia	2	5.70											138	3.53	7	.18		
Nutrition, others	3	8.55	1	2.85			1	1.63					45	1.15	3	.08	2	.05
Total diseases of nutrition	5	14.25	1	2.85			1	1.63					183	4.68	10	.26	2	.05

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Cavalry.						Artillery.						Infantry.					
Mean strength	351.						612.						39,148.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	2	5.70					16	26.14					285	7.28	3	0.08	5	0.13
Brain and spinal cord	1	2.85					1	1.63					145	3.70	12	.31	4	.10
Insanity													38	.97	18	.46		
Meningitis													22	.56	4	.10	10	.26
Poisoning, narcotic							1	1.63					10	.26	1	.03	2	.05
Nervous system, others	9	25.64					18	29.41	2	3.27			973	24.85	14	.36		
Total diseases of the nervous system	12	34.19					36	58.81	2	3.27			1,473	37.62	52	1.34	21	.54
Poisoning, irritant							5	8.17					99	2.53			2	.05
Tonsillitis, pharyngitis, and sore throat	10	28.49					15	24.51					1,298	33.15			1	.03
Peritonitis							1	1.63					19	.49			4	.10
Dyspepsia, colic, and constipation	37	105.42					32	52.29	1	1.63			2,627	67.10	1	.03		
Gastritis	3	8.55					31	50.65					1,021	26.08	5	.13		
Diarrheal diseases	222	632.48			1	2.85	338	552.28			1	1.63	12,506	319.45	28	.72	72	1.84
Enteritis	4	11.40					29	47.38	1	1.63	1	1.63	317	8.10	1	.03	5	.13
Perityphlitis and appendicitis							2	3.27					90	2.30	1	.03	3	.08
Digestive system, others	12	34.19					28	45.75			1	1.63	1,169	29.86	18	.46	6	.15
Total diseases of the digestive system	288	820.53			1	2.85	481	785.93	2	3.26	3	4.89	19,146	489.07	54	1.40	93	2.38
Heart, diseases of	6	17.09					1	1.63	1	1.63			132	3.37	21	.54	3	.08
Arteries and veins							6	9.80					87	2.22	9	.23	2	.05
Total diseases of the circulatory system	6	17.09					7	11.43	1	1.63			219	5.59	30	.77	5	.13
Bronchitis	18	51.28					59	96.41	1	1.63			3,108	79.38	7	.18		
Pneumonia	3	8.55					2	3.27			1	1.63	289	7.38	3	.08	46	1.18
Pleurisy	5	14.25					3	4.90					121	3.09	2	.05		
Respiratory system, others	1	2.85					25	40.85	1	1.63			1,710	43.68	3	.08	3	.08
Total diseases of the respiratory organs	27	76.93					89	145.43	2	3.26	1	1.63	5,228	133.53	15	.39	49	1.26

Kidneys, diseases of	2	5.70	....	....	....	....	....	....	....	....	....	....	65	1.66	3	.08	7	.18
Varicocele	1	2.85	....	....	....	....	2	3.27	....	....	....	....	159	4.06	5	.13	....	....
Genito-urinary, others	4	11.40	....	....	....	....	14	22.88	....	....	....	....	528	13.49	10	.26	....	....
Total diseases of the genito-urinary system	7	19.95	....	....	....	....	16	26.15	....	....	....	....	752	19.21	18	.47	7	.18
Adenitis	2	5.70	....	....	....	....	7	11.44	....	....	....	....	188	4.80	1	.03	....	....
Lymphatic system, others	....	....	....	....	....	....	....	....	....	....	....	....	24	.61	1	.03	....	....
Total diseases of the lymphatic system	2	5.70	....	....	....	....	7	11.44	....	....	....	....	212	5.41	2	.06	....	....
Rheumatism, muscular	7	19.94	....	....	....	....	42	68.63	1	1.63	....	....	1,901	48.56	20	.51	....	....
Osteitis and periostitis	....	....	....	....	....	....	1	1.63	1	1.63	....	....	54	1.38	2	.05	....	....
Arthritis and synovitis	3	8.55	....	....	....	....	6	9.80	....	....	....	....	250	6.39	5	.13	....	....
Rheumatism, chronic articular	2	5.70	....	....	....	....	11	17.97	....	....	....	....	399	10.19	25	.64	....	....
Muscles, bones, and joints, others	....	....	....	....	....	....	2	3.27	1	1.63	....	....	79	2.02	6	.15	....	....
Total diseases of the muscles, bones, and joints	12	34.19	....	....	....	....	62	101.30	3	4.89	....	....	2,683	68.54	58	1.48	....	....
Total diseases of the integumentary system, all	64	182.35	....	....	....	....	125	204.25	....	....	....	....	3,211	82.02	2	.05	....	....
Total diseases of the eye	2	5.70	....	....	....	....	18	29.41	2	3.27	....	....	425	10.86	8	.20	....	....
Total diseases of the ear	9	25.64	....	....	....	....	23	37.58	3	4.90	....	....	414	10.57	30	.77	....	....
Total diseases of the nose	1	2.85	....	....	....	....	....	....	....	....	....	....	45	1.15	1	.03	....	....
Total unclassified	2	5.70	....	....	....	....	....	....	....	....	....	....	193	4.93	....	....	....	....
Total for diseases	1,672	4,763.53	3	8.55	3	8.55	1,403	2,292.49	19	31.05	7	11.44	67,454	1,723.05	418	10.68	400	10.22
Drowning	....	....	....	....	....	....	....	....	....	....	1	1.63	....	....	....	....	17	.43
Exhaustion from exposure and fatigue	12	34.19	....	....	....	....	7	11.44	....	....	....	....	691	17.65	....	....	1	.03
Heat stroke	2	5.70	....	....	....	....	2	3.27	....	....	....	....	57	1.46	1	.03	....	....
Lightning	....	....	....	....	....	....	....	....	....	....	....	....	2	.05	....	....	....	....
Venomous bites, stings, and wounds	4	11.40	....	....	....	....	11	17.97	....	....	....	....	251	6.41	....	....	....	....
Abrasions, blisters, burns, and scalds	5	14.25	....	....	....	....	59	96.41	....	....	....	....	528	13.49	....	....	....	....
Compression and concussion of brain	1	2.85	....	....	....	....	....	....	....	....	....	....	8	.20	....	....	1	.03
Contusions and sprains	22	62.68	....	....	....	....	25	40.85	....	....	....	....	1,512	38.62	4	.10	....	....
Dislocations	....	....	....	....	....	....	....	....	....	....	....	....	66	1.69	....	....	....	....
Fractures (not shot)	9	25.64	....	....	....	....	3	4.90	2	3.27	....	....	186	4.75	6	.15	2	.05
Herniæ	3	8.55	....	....	....	....	6	9.80	1	1.63	....	....	301	7.69	28	.72	....	....
Wounds, contused, lacerated, and punctured	2	5.70	....	....	....	....	11	17.97	....	....	....	....	536	13.69	1	.03	1	.03
Wounds, incised	4	11.40	....	....	....	....	5	8.17	....	....	....	....	402	10.27	....	....	3	.08
Wounds, gunshot	15	42.74	....	....	....	....	20	32.68	....	....	7	11.44	1,221	31.19	50	1.28	283	7.23
Secondary results of injury	....	....	....	....	....	....	....	....	....	....	....	....	64	1.63	5	.13	....	....
Other injuries	....	....	....	....	....	....	3	4.90	....	....	....	....	168	4.29	2	.05	6	.15
Total for injuries	79	225.07	....	....	....	....	152	248.37	3	4.90	8	13.07	5,993	153.08	97	2.48	314	8.02
Total for diseases and injuries	1,751	4,988.60	3	8.55	3	8.55	1,555	2,540.85	22	35.95	15	24.51	73,447	1,876.13	515	13.16	714	18.24

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Engineers.						Signal Corps.						Army.					
Mean strength	693.						296.						41,100.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													14	0.34				
Measles	20	28.86			1	1.44	5	16.89					1,238	30.12			9	0.22
Smallpox							1	3.38					211	5.13			59	1.44
Vaccinia	36	51.95					11	37.16					3,500	85.16			1	.02
Influenza	99	142.87											3,227	78.51			4	.10
Dengue	14	20.20											556	13.53				
Mumps	8	11.54											732	17.81				
Diphtheria													30	.73			4	.10
Typhoid fever	15	21.64					18	60.81					703	17.10	12	0.29	78	1.90
Yellow fever	1	1.44			1	1.44	1	3.38			1	3.38	5	.12			2	.05
Cerebro-spinal fever							1	3.38					12	.29			8	.17
Malarial fever, intermittent	244	352.09	1	1.44			51	172.30					11,826	287.74	4	.10		
Malarial fever, remittent	74	106.79					39	131.76					7,480	182.00	5	.12	6	.15
Malarial fever, pernicious							1	3.38					54	1.31			29	.71
Malarial cachexia	81	116.88					4	13.51					451	10.97	9	.22	8	.19
Fever, undetermined	20	28.86											895	21.78				
Erysipelas	1	1.44											23	.56			2	.05
Septicæmia and tetanus	2	2.89											5	.12			1	.02
Rheumatic fever	1	1.44											129	3.14	3	.07		
Consumption	2	2.89					1	3.38	1	3.38			117	2.85	42	1.02	16	.39
Cancer							1	3.38					6	.15			1	.02
Syphilis and results	10	14.43											524	12.75	52	1.27		
Gonorrhea and results	45	64.94					14	47.30	1	3.38			2,463	59.93	16	.39		
Chancroid and results	30	43.29					12	40.54					1,626	39.56	2	.05		
Infections, others	3	4.33											82	2.00	2	.05	3	.07
Total infectious diseases	706	1,018.77	1	1.44	2	2.88	160	540.55	2	6.76	1	3.38	35,909	873.70	147	3.58	231	5.60
Anæmia	1	1.44											141	3.43	7	.17		
Nutrition, others	7	10.10	1	1.44									56	1.36	5	.12	2	.05
Total diseases of nutrition	8	11.54	1	1.44									197	4.79	12	..29	2	.05
Alcoholism	19	27.41					2	6.76					324	7.88	3	.07	5	.12
Brain and spinal cord	6	8.66											153	3.72	12	.29	4	.10

Insanity	....	....	1	1.44	....	....	....	....	....	....	....	....	38	.92	19	.46	....	....
Meningitis	1	1.44	....	....	1	1.44	....	....	....	....	....	....	23	.56	4	.10	11	.27
Poisoning, narcotic	....	....	....	....	....	....	1	3.38	....	....	....	....	12	.29	1	.02	2	.05
Nervous system, others	32	46.18	....	....	....	....	4	13.51	....	....	....	....	1,036	25.21	16	.39	....	....
Total diseases of the nervous system	58	83.69	1	1.44	1	1.44	7	23.65	....	....	....	....	1,586	38.58	55	1.33	22	.54
Poisoning, irritant	....	....	....	....	....	....	2	6.76	....	....	....	....	106	2.58	....	....	2	.05
Tonsillitis, pharyngitis, and sore throat	25	36.07	....	....	....	....	4	13.51	....	....	....	....	1,352	32.90	....	....	1	.02
Peritonitis	3	4.33	....	....	2	2.89	....	....	....	....	....	....	23	.56	....	....	6	.15
Dyspepsia, colic, and constipation	66	95.24	1	1.44	....	....	10	33.78	....	....	....	....	2,772	67.44	3	.07	....	....
Gastritis	10	14.43	....	....	....	....	6	20.27	....	....	....	....	1,071	26.06	5	.12	....	....
Diarrheal diseases	236	340.55	....	....	....	....	172	581.08	....	....	....	....	13,474	327.84	28	.68	74	1.80
Enteritis	4	5.77	....	....	....	....	33	111.49	....	....	....	....	387	9.42	2	.05	6	.15
Perityphlitis and appendicitis	2	2.89	....	....	....	....	2	6.76	....	....	....	....	96	2.34	1	.02	3	.07
Digestive system, others	77	111.11	1	1.44	....	....	9	30.41	....	....	....	....	1,295	31.51	19	.46	7	.17
Total diseases of the digestive system	423	610.39	2	2.88	2	2.89	238	804.06	....	....	....	....	20,576	500.65	58	1.40	99	2.41
Heart, diseases of	1	1.44	2	2.89	....	....	....	....	....	....	....	....	140	3.41	24	.58	3	.07
Arteries and veins	3	4.33	....	....	....	....	....	....	....	....	....	....	96	2.34	9	.22	2	.05
Total diseases of the circulatory system	4	5.77	2	2.89	....	....	....	....	....	....	....	....	236	5.75	33	.80	5	.12
Bronchitis	147	212.12	....	....	....	....	4	13.51	....	....	....	....	3,336	81.17	8	.19	....	....
Pneumonia	13	18.76	....	....	3	4.33	2	6.76	....	....	....	....	309	7.52	3	.07	50	1.22
Pleurisy	3	4.33	....	....	....	....	2	6.76	....	....	....	....	134	3.26	2	.05	....	....
Respiratory system, others	18	25.97	....	....	....	....	7	23.65	....	....	....	....	1,761	42.85	4	.10	3	.07
Total diseases of the respiratory organs	181	261.18	....	....	3	4.33	15	50.68	....	....	....	....	5,540	134.80	17	.41	53	1.29
Kidneys, diseases of	1	1.44	....	....	....	....	....	....	....	....	....	....	68	1.65	3	.07	7	.17
Varicocele	2	2.89	....	....	....	....	1	3.38	....	....	....	....	165	4.01	5	.12	....	....
Genito-urinary, others	6	8.66	....	....	....	....	5	16.89	....	....	....	....	557	13.55	10	.24	....	....
Total diseases of the genito-urinary system	9	12.99	....	....	....	....	6	20.27	....	....	....	....	790	19.21	18	.43	7	.17
Adenitis	3	4.33	....	....	....	....	3	10.14	....	....	....	....	203	4.94	1	.02	....	....
Lymphatic system, others	4	5.77	....	....	....	....	1	3.38	....	....	....	....	29	.71	1	.02	....	....
Total diseases of the lymphatic system	7	10.10	....	....	....	....	4	13.52	....	....	....	....	232	5.65	2	.04	....	....
Rheumatism, muscular	88	126.98	....	....	....	....	5	16.89	....	....	....	....	2,043	49.71	21	.51	....	....
Osteitis and periostitis	....	....	....	....	....	....	....	....	....	....	....	....	55	1.34	3	.07	....	....
Arthritis and synovitis	5	7.22	....	....	....	....	....	....	....	....	....	....	264	6.42	5	.12	....	....
Rheumatism, chronic articular	14	20.20	....	....	....	....	1	3.38	....	....	....	....	427	10.39	25	.61	....	....
Muscles, bones, and joints, others	4	5.77	....	....	....	....	....	....	....	....	....	....	85	2.07	7	.17	....	....
Total diseases of the muscles, bones, and joints	111	160.17	....	....	....	....	6	20.27	....	....	....	....	2,874	69.93	61	1.48	....	....

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Engineers.						Signal Corps.						Army.					
Mean strength	693.						296.						41,100.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	59	85.14	.....	.....	.....	.....	12	40.54	.....	.....	.....	.....	3,471	84.45	2	0.05	.....	.....
Total diseases of the eye	18	25.97	.....	.....	.....	.....	1	3.38	1	3.38	.....	.....	464	11.29	11	.27	.....	.....
Total diseases of the ear	3	4.33	3	4.33	.....	.....	2	6.76	.....	.....	.....	.....	451	10.97	36	.88	.....	.....
Total diseases of the nose	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	1.12	1	.02	.....	.....
Total unclassified	7	10.10	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	203	4.94	.....	.....	.....	.....
Total for diseases	1,594	2,300.14	10	14.43	8	11.54	452	1,527.03	3	10.14	1	3.38	72,575	1,765.82	453	11.02	419	10.20
Drowning	.....	.....	.....	.....	1	1.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	.46
Exhaustion from exposure and fatigue	2	2.89	.....	.....	.....	.....	2	6.76	.....	.....	.....	.....	714	17.37	.....	.....	1	.02
Heat stroke	.....	.....	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	62	1.51	1	.02	.....	.....
Lightning	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.05	.....	.....	.....	.....
Venomous bites, stings, and wounds	10	14.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	276	6.71	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	8	11.54	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	603	14.67	.....	.....	.....	.....
Compression and concussion of brain	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	.22	.....	.....	1	.02
Contusions and sprains	43	62.05	.....	.....	.....	.....	8	27.03	.....	.....	.....	.....	1,610	39.17	4	.10	.....	.....
Dislocations	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	1.61	.....	.....	.....	.....
Fractures (not shot)	5	7.22	.....	.....	.....	.....	.....	.....	.....	.....	1	3.38	203	4.94	8	.19	3	.07
Herniæ	7	10.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	317	7.71	29	.71	.....	.....
Wounds, contused, lacerated, and punctured	22	31.75	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	574	13.96	1	.02	1	.02
Wounds, incised	10	14.43	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	424	10.32	.....	.....	3	.07
Wounds, gunshot	3	4.33	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	1,260	30.66	50	1.22	290	7.06
Secondary results of injury	.....	.....	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	65	1.58	5	.12	.....	.....
Other injuries	4	5.77	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	176	4.28	2	.05	6	.15
Total for injuries	114	164.50	.....	.....	1	1.44	23	77.70	.....	.....	1	3.38	6,361	154.77	100	2.43	324	7.88
Total for diseases and injuries	1,708	2,464.65	10	14.43	9	12.99	475	1,604.73	3	10.14	2	6.76	78,936	1,920.49	553	13.45	743	18.08

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	8,082.						380.						16,358.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.74																
Measles	418	51.72			4	0.49					1	2.63	292	17.85				
Smallpox	4	.49			2	.25	1	2.63					157	9.60			55	3.36
Vaccinia	584	72.26			1	.12							819	50.07				
Influenza	114	14.10					1	2.63					54	3.30				
Dengue	45	5.57											491	30.01				
Mumps	153	18.93											274	16.75				
Diphtheria	1	.12											24	1.47			3	.18
Typhoid fever	176	21.78	1	0.12	22	2.72	8	21.05			1	2.63	301	18.40	6	0.37	36	2.20
Yellow fever	4	.49			1	.12												
Cerebro-spinal fever	2	.25			4	.49							1	.06			1	.06
Malarial fever, intermittent	5,353	662.34	2	.25			98	257.89					4,150	253.70	2	.12		
Malarial fever, remittent	2,797	346.08	3	.37	3	.37	44	115.79					4,096	250.40	2	.12	1	.06
Malarial fever, pernicious	32	3.96			20	2.47	1	2.63					13	.79			5	.31
Malarial cachexia	285	35.26	3	.37	7	.87	2	5.26					95	5.81	2	.12	1	.06
Fever, undetermined	181	22.40											540	33.01				
Erysipelas	3	.37											11	.67			2	.12
Septicæmia and tetanus	1	.12			1	.12							4	.24				
Rheumatic fever	21	2.60	1	.12									77	4.71	1	.06		
Consumption	36	4.45	10	1.24	7	.87	2	5.26			1	2.63	49	3.00	24	1.47	4	.24
Cancer	1	.12											3	.18			1	.06
Syphilis and results	142	17.57	13	1.61			19	50.00					157	9.60	14	.86		
Gonorrhea and results	488	60.38	2	.25			52	136.84					838	51.23	1	.06		
Chancroid and results	305	37.74					8	21.05					833	50.93				
Infections, others	34	4.21			1	.12	1	2.63					7	.43			2	.12
Total infectious diseases	11,186	1,384.05	35	4.33	73	9.01	237	623.66			3	7.89	13,286	812.21	52	3.18	111	6.77
Anæmia	24	2.97	1	.12									35	2.14				
Nutrition, others	7	.87	1	.12	1	.12	6	15.79					17	1.04	2	.12	1	.06
Total diseases of nutrition	31	3.84	2	.24	1	.12	6	15.79					52	3.18	2	.12	1	.06

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	8,082.						380.						16,358.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	142	17.57	2	0.25	3	0.37	17	44.74	....	....	....	....	76	4.65	1	0.06	2	0.12
Brain and spinal cord	46	5.69	1	.12	2	.25	2	5.26	1	2.63	....	....	48	2.93	8	.49	2	.12
Insanity	9	1.11	5	.62	....	....	....	....	....	....	....	....	16	.98	3	.18	....	....
Meningitis	2	.25	....	....	1	.12	....	....	....	....	....	....	5	.31	4	.24	4	.24
Poisoning, narcotic	3	.37	1	.12	1	.12	....	....	....	....	....	....	4	.24	....	....	....	....
Nervous system, others	195	24.13	3	.37	....	....	10	26.32	....	....	....	....	511	31.21	7	.43	....	....
Total diseases of the nervous system	397	49.12	12	1.48	7	.86	29	76.32	1	2.63	....	....	660	40.35	23	1.40	8	.48
Poisoning, irritant	10	1.24	....	....	....	....	....	....	....	....	....	....	20	1.22	....	....	1	.06
Tonsillitis, pharyngitis, and sore throat	181	22.40	....	....	....	....	11	28.95	....	....	....	....	358	21.88	....	....	1	.06
Peritonitis	5	.62	....	....	2	.25	1	2.63	....	....	....	....	14	.86	....	....	4	.24
Dyspepsia, colic, and constipation	765	94.66	2	.25	....	....	21	55.26	....	....	....	....	881	53.86	....	....	....	....
Gastritis	167	20.66	....	....	....	....	11	28.95	....	....	....	....	684	41.81	3	.18	....	....
Diarrheal diseases	3,014	372.93	2	.25	19	2.35	72	189.47	....	....	....	....	8,558	523.17	23	1.41	49	3.00
Enteritis	74	9.16	....	....	3	.37	2	5.26	....	....	....	....	209	12.78	1	.06	3	.18
Perityphlitis and appendicitis	18	2.23	....	....	1	.12	1	2.63	....	....	....	....	41	2.51	1	.06	2	.12
Digestive system, others	271	33.53	7	.87	1	.12	9	23.68	....	....	....	....	476	29.10	1	.06	5	.31
Total diseases of the digestive system.	4,505	557.42	11	1.37	26	3.21	128	336.83	....	....	....	....	11,241	687.19	29	1.77	65	3.97
Heart, diseases of	23	2.85	9	1.11	1	.12	1	2.63	....	....	....	....	68	4.16	9	.55	2	.12
Arteries and veins	13	1.61	3	.37	....	....	1	2.63	....	....	....	....	50	3.06	2	.12	2	.12
Total diseases of the circulatory system.	36	4.46	12	1.48	1	.12	2	5.26	....	....	....	....	118	7.22	11	.67	4	.24
Bronchitis	498	61.62	1	.12	....	....	21	55.26	....	....	....	....	655	40.04	4	.24	....	....
Pneumonia	51	6.31	....	....	11	1.36	2	5.26	....	....	....	....	43	2.63	1	.06	1	.06
Pleurisy	26	3.22	....	....	....	....	2	5.26	....	....	....	....	53	3.24	....	....	....	....
Respiratory system, others	347	42.94	2	.25	1	.12	16	42.10	....	....	....	....	204	12.47	1	.06	1	.06
Total diseases of the respiratory organs.	922	114.09	3	.37	12	1.48	41	107.88	....	....	....	....	955	58.38	6	.36	2	.12

Kidneys, diseases of	20	2.47	1	.12	1	12	2	5.26	....	....	....	....	30	1.83	1	.06	2	.12
Varicocele	37	4.58	1	.12	....	....	1	2.63	....	....	....	....	89	5.41	2	.12	....	....
Genito-urinary, others	132	16.33	3	.37	....	....	1	2.63	....	....	....	....	229	14.00	1	.06	....	....
Total diseases of the genito-urinary system	189	23.38	5	.61	1	12	4	10.52	....	....	....	....	348	21.27	4	.24	2	.12
Adenitis	33	4.08	....	....	....	....	5	13.16	....	....	....	....	93	5.69	1	.06	....	....
Lymphatic system, others	1	.12	....	....	....	....	....	....	....	....	....	....	19	1.16	1	.06	....	....
Total diseases of the lymphatic system	34	4.20	....	....	....	....	5	13.16	....	....	....	....	112	6.85	2	.12	....	....
Rheumatism, muscular	467	57.79	2	.25	....	....	12	31.58	....	....	....	....	659	40.29	7	.43	....	....
Osteitis and periostitis	9	1.11	....	....	....	....	....	....	....	....	....	....	21	1.28	....	....	....	....
Arthritis and synovitis	55	6.81	....	....	....	....	1	2.63	....	....	....	....	114	6.97	3	.18	....	....
Rheumatism, chronic articular	105	12.99	3	.37	....	....	1	2.63	....	....	....	....	203	12.41	9	.55	....	....
Muscles, bones, and joints, others	15	1.86	1	.12	....	....	1	2.63	....	....	....	....	32	1.96	6	.37	....	....
Total diseases of the muscles, bones, and joints	651	80.56	6	.74	....	....	15	39.47	....	....	....	....	1,029	62.91	25	1.53	....	....
Total diseases of the integumentary system, all	538	66.56	....	....	....	....	38	100.00	....	....	....	....	2,083	127.34	2	.12	....	....
Total diseases of the eye	91	11.26	....	....	....	....	8	21.05	....	....	....	....	208	12.72	8	.49	....	....
Total diseases of the ear	53	6.56	6	.74	....	....	7	18.42	....	....	....	....	283	17.30	26	1.59	....	....
Total diseases of the nose	4	.49	....	....	....	....	....	....	....	....	....	....	5	.31	....	....	....	....
Total unclassified	46	5.69	....	....	....	....	13	34.21	....	....	....	....	33	2.02	....	....	....	....
Total for diseases	18,683	2,311.68	92	11.38	121	14.97	533	1,402.63	1	2.63	3	7.89	30,413	1,859.21	190	11.62	193	11.80
Drowning	....	....	....	....	2	.25	....	....	....	....	....	....	....	....	....	....	15	.92
Exhaustion from exposure and fatigue	10	1.24	....	....	....	....	1	2.63	....	....	....	....	656	40.10	....	....	1	.06
Heat stroke	6	.74	....	....	....	....	....	....	....	....	....	....	49	3.00	1	.06	....	....
Lightning	....	....	....	....	....	....	....	....	....	....	....	....	2	.12	....	....	....	....
Venomous bites, stings, and wounds	63	7.80	....	....	....	....	12	31.58	....	....	....	....	155	9.48	....	....	....	....
Abrasions, blisters, burns, and scalds	159	19.67	....	....	....	....	9	23.68	....	....	....	....	208	12.72	....	....	....	....
Compression and concussion of brain	2	.25	....	....	1	.12	....	....	....	....	....	....	5	.31	....	....	....	....
Contusions and sprains	345	42.69	....	....	....	....	22	57.89	....	....	....	....	513	31.36	2	.12	....	....
Dislocations	15	1.86	....	....	....	....	1	2.63	....	....	....	....	13	.79	....	....	....	....
Fractures (not shot)	31	3.84	1	.12	1	.12	8	21.05	....	....	....	....	86	5.26	3	.18	....	....
Herniæ	54	6.68	5	.62	....	....	3	7.89	1	2.63	....	....	159	9.72	6	.37	....	....
Wounds, contused, lacerated, and punctured	148	18.31	....	....	....	....	10	26.32	....	....	....	....	174	10.64	1	.06	....	....
Wounds, incised	127	15.71	....	....	1	.12	3	7.89	....	....	1	2.63	125	7.64	....	....	1	.06
Wounds, gunshot	23	2.85	2	.25	5	.62	1	2.63	....	....	....	....	1,158	70.79	40	2.45	275	16.81
Secondary results of injury	15	1.86	....	....	....	....	....	....	....	....	....	....	22	1.34	1	.06	....	....
Other injuries	53	6.56	1	.12	2	.25	1	2.63	....	....	....	....	52	3.18	....	....	3	.18
Total for injuries	1,051	130.04	9	1.11	12	1.48	71	186.84	1	2.63	1	2.63	3,377	206.44	54	3.30	295	18.03
Total for diseases and injuries	19,734	2,441.72	101	12.50	133	16.46	604	1,589.47	2	5.26	4	10.53	33,790	2,065.65	244	14.92	488	29.83

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Total, islands.						Total, United States.					
Mean strength	24,820.						15,984.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.24	......	......	......	......	8	0.50	......	......	......	......
Measles	710	28.21	......	......	5	0.20	523	32.72	......	......	4	0.25
Smallpox	162	6.53	......	......	57	2.30	48	3.00	......	......	2	.12
Vaccinia	1,403	56.53	......	......	1	.04	2,086	130.50	......	......	......	......
Influenza	169	6.81	......	......	......	......	3,058	191.26	......	......	4	.25
Dengue	536	21.60	......	......	......	......	20	1.25	......	......	......	......
Mumps	427	17.20	......	......	......	......	305	19.08	......	......	......	......
Diphtheria	25	1.01	......	......	3	.12	5	.31	......	......	1	.06
Typhoid fever	485	19.54	7	0.28	59	2.38	200	12.51	5	0.31	19	1.19
Yellow fever	4	.16	......	......	1	.04	......	......	......	......	......	......
Cerebro-spinal fever	3	.12	......	......	5	.20	8	.50	......	......	3	.19
Malarial fever, intermittent	9,601	386.83	4	.16	......	......	2,174	136.01	......	......	......	......
Malarial fever, remittent	6,937	279.49	5	.20	4	.16	504	31.53	......	......	2	.12
Malarial fever, pernicious	46	1.85	......	......	25	1.01	7	.44	......	......	4	.25
Malarial cachexia	382	15.39	5	.20	8	.32	65	4.07	4	.25	......	......
Fever, undetermined	721	29.05	......	......	......	......	174	10.89	......	......	......	......
Erysipelas	14	.56	......	......	2	.08	9	.56	......	......	......	......
Septicæmia and tetanus	5	.20	......	......	1	.04	......	......	......	......	......	......
Rheumatic fever	98	3.95	2	.08	......	......	31	1.94	1	.06	......	......
Consumption	87	3.51	34	1.37	12	.48	29	1.81	7	.44	4	.25
Cancer	4	.16	......	......	1	.04	1	.06	......	......	......	......
Syphilis and results	318	12.81	27	1.09	......	......	206	12.89	25	1.56	......	......
Gonorrhea and results	1,378	55.52	3	.12	......	......	1,071	67.01	12	.75	......	......
Chancroid and results	1,146	46.17	......	......	......	......	468	29.28	2	.12	......	......
Infections, others	42	1.69	......	......	3	.12	40	2.50	2	.12	......	......
Total infectious diseases	24,709	999.53	87	3.51	187	7.53	11,040	690.62	58	3.61	43	2.68
Anæmia	59	2.38	1	.04	......	......	82	5.13	6	.38	......	......
Nutrition, others	30	1.21	3	.12	2	.08	26	1.63	2	.12	......	......
Total diseases of nutrition	89	3.59	4	.16	2	.08	108	6.76	8	.50	......	......

Alcoholism	235	9.47	3	.12	5	.20	87	5.44	...	...	...	...
Brain and spinal cord	96	3.87	10	.40	1	.16	57	3.57	2	.12	...	...
Insanity	25	1.01	8	.32	...	...	13	.81	11	.69	...	...
Meningitis	7	.28	4	.16	5	.20	16	1.00	...	...	6	.38
Poisoning, narcotic	7	.28	1	.04	1	.04	4	.25	...	...	1	.06
Nervous system, others	716	28.85	10	.40	...	...	316	19.77	6	.38	...	...
Total diseases of the nervous system	1,086	43.75	36	1.45	15	.60	493	30.84	19	1.19	7	.44
Poisoning, irritant	30	1.21	...	...	1	.04	74	4.63	...	...	1	.06
Tonsillitis, pharyngitis, and sore throat	550	22.16	...	...	1	.04	798	49.93	...	...	...	...
Peritonitis	20	.81	...	...	6	.24	3	.19	...	...	...	...
Dyspepsia, colic, and constipation	1,667	67.16	2	.08	...	...	1,095	68.51	1	.06	...	...
Gastritis	862	34.73	3	.12	...	...	203	12.70	2	.12	...	...
Diarrheal diseases	11,644	469.14	25	1.01	68	2.74	1,658	103.73	3	.19	6	.38
Enteritis	285	11.48	1	.04	6	.24	69	4.32	1	.06	...	...
Perityphlitis and appendicitis	60	2.42	1	.04	3	.12	34	2.13	...	...	...	...
Digestive system, others	756	30.46	8	.32	6	.24	530	33.16	11	.69	1	.06
Total diseases of the digestive system	15,874	639.57	40	1.61	91	3.67	4,464	279.27	18	1.12	8	.50
Heart, diseases of	92	3.71	18	.73	3	.12	48	3.00	6	.38	...	...
Arteries and veins	64	2.58	5	.20	2	.08	32	2.00	4	.25	...	...
Total diseases of the circulatory system	156	6.28	23	.93	5	.20	80	5.00	10	.63	...	...
Bronchitis	1,174	47.30	5	.20	...	...	2,158	135.01	3	.19	...	...
Pneumonia	96	3.87	1	.04	12	.48	211	13.20	2	.12	38	2.38
Pleurisy	81	3.26	...	...	...	...	51	3.19	2	.12	...	...
Respiratory system, others	567	22.85	3	.12	2	.08	1,187	74.26	1	.06	1	.06
Total diseases of the respiratory organs	1,918	77.28	9	.36	14	.56	3,607	225.66	8	.49	39	2.40
Kidneys, diseases of	52	2.10	2	.08	3	.12	16	1.00	1	.06	4	.25
Varicocele	127	5.12	3	.12	...	...	37	2.31	2	.12	...	...
Genito-urinary, others	362	14.59	4	.16	...	...	190	11.89	6	.38	...	...
Total diseases of the genito-urinary system	541	21.80	9	.36	3	.12	243	15.20	9	.56	4	.25
Adenitis	131	5.28	1	.04	...	...	69	4.32	...	...	...	...
Lymphatic system, others	20	.81	1	.04	...	...	8	.50	...	...	...	...
Total diseases of the lymphatic system	151	6.08	2	.08	...	...	77	4.82	...	...	...	...
Rheumatism, muscular	1,138	45.85	9	.36	...	...	900	56.31	12	.75	...	...
Osteitis and periostitis	30	1.21	...	...	...	...	25	1.56	3	.19	...	...
Arthritis and synovitis	170	6.85	3	.12	...	...	94	5.88	2	.12	...	...
Rheumatism, chronic articular	309	12.45	12	.48	...	...	117	7.32	13	.81	...	...
Muscles, bones, and joints, others	48	1.93	7	.28	...	...	37	2.31	...	...	...	...
Total diseases of the muscles, bones, and joints	1,695	68.30	31	1.25	...	...	1,173	73.38	30	1.87	...	...

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Total, islands.						Total, United States.					
Mean strength	24,820.						15,984.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	2,659	107.14	2	0.08			800	50.05				
Total diseases of the eye	307	12.37	8	.32			156	9.76	2	0.12		
Total diseases of the ear	343	13.82	32	1.29			106	6.63	4	.25		
Total diseases of the nose	9	.36					37	2.31	1	.06		
Total unclassified	92	3.71					110	6.88				
Total for diseases	49,629	1,999.57	283	11.40	317	12.77	22,494	1,407.28	167	10.45	101	6.32
Drowning					17	.68					2	.12
Exhaustion from exposure and fatigue	667	26.88			1	.04	45	2.81				
Heat stroke	55	2.22	1	.04			6	.38				
Lightning	2	.08										
Venomous bites, stings, and wounds	230	9.27					46	2.88				
Abrasions, blisters, burns, and scalds	376	15.15					224	14.01				
Compression and concussion of brain	7	.28			1	.04	2	.12				
Contusions and sprains	880	35.45	2	.08			722	45.17	2	.12		
Dislocations	29	1.17					37	2.31				
Fractures (not shot)	125	5.04	4	.16	1	.04	78	4.88	4	.25	1	.06
Herniæ	216	8.70	12	.48			101	6.32	17	1.06		
Wounds, contused, lacerated, and punctured	332	13.38	1	.04			239	14.95			1	.06
Wounds, incised	255	10.27			3	.12	166	10.38				
Wounds, gunshot	1,182	47.62	42	1.69	280	11.28	77	4.82	8	.50	10	.62
Secondary results of injury	37	1.49	1	.04			27	1.69	4	.25		
Other injuries	106	4.27	1	.04	5	.20	69	4.32	1	.06	1	.06
Total for injuries	4,499	181.27	64	2.58	308	12.41	1,839	115.05	36	2.25	15	.94
Total for diseases and injuries	54,128	2,180.87	347	13.98	625	25.18	24,333	1,522.33	203	12.70	116	7.26

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service.*

	Cavalry.						Artillery.						Infantry.					
Mean strength	11,870.						11,238.						71,750.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													15	0.21				
Measles	127	10.70			2	0.17	266	23.67			1	0.09	1,995	27.80	1	0.01	17	0.24
Smallpox	8	.67			1	.08	27	2.40			3	.27	302	4.21			79	1.10
Vaccinia	467	39.34					583	51.88					5,378	74.95	1	.01	1	.01
Influenza	496	41.79					553	49.21					4,129	57.55			4	.06
Dengue	268	22.58					118	10.50					1,127	15.71				
Mumps	112	9.44					92	8.19					1,510	21.05				
Diphtheria	4	.34					6	.53					38	.53			5	.07
Typhoid fever	432	36.40	3	0.25	44	3.71	208	18.51	1	0.09	26	2.31	1,371	19.11	20	.28	171	2.38
Yellow fever	26	2.19			8	.67	34	3.03			7	.62	170	2.37			31	.43
Cerebro-spinal fever	8	.67			4	.34	2	.18			3	.27	47	.66	2	.03	30	.42
Malarial fever, intermittent	7,320	616.68	1	.08			2,967	264.02					29,293	408.26	2	.03		
Malarial fever, remittent	1,831	154.26	1	.08	2	.17	1,113	99.04					13,514	188.34	6	.08	12	.17
Malarial fever, pernicious	31	2.61			4	.34	3	.27			2	.18	109	1.52			52	.72
Malarial cachexia	276	23.25	10	.84	3	.25	117	10.41	5	.44			1,437	20.03	79	1.10	16	.22
Fever, undetermined	412	34.71					167	14.86					1,929	26.88				
Erysipelas	13	1.10					12	1.07			1	.09	57	.79			3	.04
Septicæmia and tetanus	3	.25			2	.17	4	.36					14	.20	1	.01	5	.07
Rheumatic fever	79	6.66	2	.17			61	5.43	2	.18	1	.09	487	6.79	4	.06	1	.01
Consumption	42	3.54	27	2.27	1	.08	61	5.43	39	3.47	4	.36	268	3.74	99	1.38	51	.71
Cancer	5	.42	1	.08			5	.44	2	.18			9	.13	1	.01	2	.03
Syphilis and results	223	18.79	29	2.44			233	20.73	37	3.29			942	13.13	118	1.64		
Gonorrhea and results	1,415	119.21	9	.76			1,400	124.58	12	1.07			5,080	70.80	30	.42	1	.01
Chancroid and results	545	45.92	2	.17			459	40.84	1	.09			2,898	40.39	8	.11		
Infections, others	66	5.56	1	.08	1	.08	14	1.25	1	.09			181	2.52	4	.06	3	.04
Total infectious diseases	14,209	1,197.08	86	7.25	72	6.07	8,505	756.83	100	8.90	48	4.28	72,300	1,007.67	376	5.23	484	6.73
Anæmia	64	5.39	1	.08			22	1.96	1	.09			386	5.38	11	.15	1	.01
Nutrition, others	23	1.94	4	.34			9	.80	1	.09			78	1.09	14	.20	4	.06
Total diseases of nutrition	87	7.33	5	.42			31	2.76	2	.18			464	6.47	25	.35	5	.07

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

	Cavalry.						Artillery.						Infantry.					
Mean strength	11,870.						11,238.						71,750.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	150	12.64	.....	....	6	0.51	292	25.98	.....	....	1	0.09	931	12.98	5	0.07	19	0.26
Brain and spinal cord	143	12.05	15	1.26	4	.34	72	6.41	12	1.07	2	.18	390	5.44	65	.91	10	.14
Insanity	22	1.85	9	.76	.....	....	19	1.69	11	.98	.....	....	122	1.70	57	.79	.....	....
Meningitis	2	.17	.....	....	.....	....	5	.44	1	.09	2	.18	31	.43	5	.07	14	.20
Poisoning, narcotic	6	.51	1	.08	1	.08	7	.62	.....	....	1	.09	25	.35	1	.01	10	.14
Nervous system, others	411	34.63	15	1.26	.....	....	305	27.14	10	.89	.....	....	1,769	24.65	42	.59	3	.04
Total diseases of the nervous system	734	61.85	40	3.37	11	.93	700	62.28	34	3.03	6	.54	3,268	45.55	175	2.44	56	.78
Poisoning, irritant	23	1.94	.....	....	.....	....	11	.98	.....	....	.....	....	174	2.42	.....	....	6	.08
Tonsillitis, pharyngitis, and sore throat	1,031	86.87	.....	....	.....	....	720	64.07	.....	....	1	.09	2,944	41.03	.....	....	1	.01
Peritonitis	7	.59	.....	....	1	.08	6	.53	.....	....	1	.09	31	.43	.....	....	9	.13
Dyspepsia, colic, and constipation	1,332	112.22	1	.08	.....	....	1,023	91.04	2	.18	.....	....	5,212	72.64	7	.10	.....	....
Gastritis	280	23.59	.....	....	.....	....	255	22.69	.....	....	.....	....	2,216	30.88	8	.11	5	.07
Diarrheal diseases	4,363	367.57	8	.67	10	.84	3,230	287.42	8	.71	4	.36	31,107	433.55	75	1.05	204	2.84
Enteritis	89	7.50	.....	....	.....	....	206	18.33	1	.09	4	.36	743	10.36	5	.07	16	.22
Perityphlitis and appendicitis	36	3.03	3	.25	2	.17	24	2.14	2	.18	1	.09	161	2.24	3	.04	12	.17
Digestive system, others	540	45.49	3	.25	2	.17	489	43.51	6	.53	3	.27	2,328	32.45	33	.46	16	.22
Total diseases of the digestive system	7,701	648.80	15	1.26	15	1.26	5,964	530.71	19	1.69	14	1.26	44,916	626.00	131	1.83	269	3.74
Heart, diseases of	95	8.00	27	2.27	6	.51	65	5.78	15	1.33	5	.44	360	5.02	86	1.20	16	.22
Arteries and veins	29	2.44	6	.51	1	.08	31	2.76	2	.18	.....	....	173	2.41	22	.31	4	.06
Total diseases of the circulatory system	124	10.44	33	2.78	7	.59	96	8.54	17	1.51	5	.44	533	7.43	108	1.51	20	.28
Bronchitis	1,216	102.44	1	.08	.....	....	1,132	100.72	1	.09	.....	....	5,438	75.79	10	.14	.....	....
Pneumonia	72	6.07	.....	....	8	.67	42	3.74	.....	....	5	.44	417	6.23	9	.13	75	1.05
Pleurisy	52	4.38	.....	....	.....	....	61	5.43	2	.18	.....	....	268	3.74	6	.08	2	.03
Respiratory system, others	428	36.06	2	.17	.....	....	629	55.97	11	.98	1	.09	2,563	35.72	9	.13	8	.11
Total diseases of the respiratory organs	1,768	148.95	3	.25	8	.67	1,864	165.86	14	1.25	6	.53	8,716	121.48	34	.48	85	1.19

Kidneys, diseases of	27	2.27	5	.42	3	.25	25	2.22	1	.09	1	.09	168	2.34	8	.11	21	.29
Varicocele	74	6.23	4	.34	.....	.....	58	5.16	3	.27	.....	.....	267	3.72	10	.14	.....	.....
Genito-urinary, others	228	19.21	4	.31	.....	.....	166	14.77	4	.36	.....	.....	945	13.17	18	.25	.....	.....
Total diseases of the genito-urinary system	329	27.71	13	1.10	3	.25	249	22.15	8	.72	1	.09	1,380	19.23	36	.50	21	.29
Adenitis	126	10.61	1	.08	.....	.....	115	10.23	.....	.....	.....	.....	412	5.74	1	.01	.....	.....
Lymphatic system, others	27	2.27	3	.25	.....	.....	7	.62	.....	.....	.....	.....	54	.75	1	.01	.....	.....
Total diseases of the lymphatic system	153	12.88	4	.33	.....	.....	122	10.85	.....	.....	.....	.....	466	6.49	2	.02	.....	.....
Rheumatism, muscular	822	69.26	6	.51	.....	.....	666	59.26	6	.53	.....	.....	3,746	52.21	39	.54	.....	.....
Osteitis and periostitis	33	2.78	.....	.....	.....	.....	26	2.31	3	.27	.....	.....	127	1.77	4	.06	.....	.....
Arthritis and synovitis	131	11.04	2	.17	.....	.....	90	8.01	1	.09	.....	.....	607	8.46	14	.20	.....	.....
Rheumatism, chronic articular	76	6.40	16	1.35	.....	.....	59	5.25	5	.44	.....	.....	739	10.30	66	.92	.....	.....
Muscles, bones, and joints, others	66	5.56	9	.76	.....	.....	61	5.43	7	.62	.....	.....	182	2.54	30	.42	.....	.....
Total diseases of the muscles, bones, and joints	1,128	93.04	33	2.79	.....	.....	902	80.26	22	1.95	.....	.....	5,401	75.28	153	2.14	.....	.....
Total diseases of the integumentary system, all	2,021	170.26	3	.25	.....	.....	1,618	143.98	10	.89	.....	.....	8,844	123.26	6	.08	1	.01
Total diseases of the eye	214	18.03	11	.93	.....	.....	190	16.91	11	.98	.....	.....	882	12.29	36	.50	.....	.....
Total diseases of the ear	170	14.32	12	1.01	.....	.....	165	14.68	10	.89	.....	.....	926	12.91	62	.86	.....	.....
Total diseases of the nose	31	2.61	1	.08	.....	.....	27	2.40	.....	.....	.....	.....	78	1.09	2	.03	.....	.....
Total unclassified	284	23.93	1	.08	.....	.....	53	4.72	.....	.....	.....	.....	407	5.67	.....	.....	1	.01
Total for diseases	28,953	2,139 18	260	21.90	116	9.77	20,486	1,822.92	247	21.98	80	7.12	148,581	2,070.82	1,146	15.97	942	13.13
Drowning	.....	.....	.....	.....	11	.93	.....	.....	.....	.....	8	.71	.....	.....	.....	.....	78	1.09
Exhaustion from exposure and fatigue	76	6.40	.....	.....	.....	.....	85	7.56	.....	.....	.....	.....	1,269	17.69	.....	.....	3	.04
Heat stroke	10	.84	.....	.....	.....	.....	20	1.78	.....	.....	.....	.....	166	2.31	2	.03	.....	.....
Lightning	2	.17	.....	.....	2	.17	.....	.....	.....	.....	.....	.....	4	.06	1	.01	.....	.....
Venomous bites, stings, and wounds	141	11.88	.....	.....	.....	.....	126	11.21	.....	.....	.....	.....	541	7.54	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	277	23.34	.....	.....	.....	.....	267	23.76	.....	.....	.....	.....	1,085	15.12	.....	.....	.....	.....
Compression and concussion of brain	9	.76	1	.08	.....	.....	8	.71	.....	.....	.....	.....	15	.21	.....	.....	3	.04
Contusions and sprains	2,230	187.88	4	.34	.....	.....	1,226	109.10	.....	.....	.....	.....	3,314	46.19	7	.10	.....	.....
Dislocations	43	3.62	.....	.....	.....	.....	44	3.92	1	.09	.....	.....	141	1.97	2	.03	.....	.....
Fractures (not shot)	157	13.23	6	.51	3	.25	123	10.94	9	.80	3	.27	352	4.91	21	.29	5	.07
Herniæ	63	5.31	16	1.35	.....	.....	96	8.54	16	1.42	.....	.....	584	8.14	84	1.17	1	.01
Wounds, contused, lacerated, and punctured	613	51.64	.....	.....	.....	.....	481	42.80	.....	.....	.....	.....	1,175	16.38	2	.03	2	.03
Wounds, incised	214	18.03	1	.08	.....	.....	200	17.80	.....	.....	1	.09	833	11.61	5	.07	19	.26
Wounds, gunshot	133	11.20	23	1.94	37	3.12	156	13.88	13	1.16	35	3.11	1,942	27.07	187	2.61	453	6.31
Secondary results of injury	86	7.25	11	.93	.....	.....	39	3.47	4	.36	.....	.....	222	3.09	18	.25	1	.01
Other injuries	206	17.35	4	.34	1	.08	157	13.98	3	.27	2	.18	405	5.64	9	.13	13	.18
Total for injuries	4,260	358.89	66	5.56	54	4.55	3,028	269.45	46	4.09	49	4.36	12,048	167.92	338	4.71	578	8.06
Total for diseases and injuries	33,213	2,798.06	326	27.46	170	14.32	23,514	2,092.37	293	26.07	129	11.48	160,629	2,238.73	1,484	20.68	1,520	21.19

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

	Engineers.						Ordnance.						Signal Corps.					
Mean strength	1,363.						740.						719.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	21	15.41			1	0.73							10	13.91				
Smallpox	1	.73											1	1.39				
Vaccinia	63	46.23					7	9.46					11	15.30				
Influenza	114	83.64					71	95.94					1	1.39				
Dengue	17	12.47											6	8.34				
Mumps	8	5.87					1	1.35					3	4.17				
Typhoid fever	16	11.74					2	2.70					28	38.94				
Yellow fever	1	.73			1	.73	1	1.35			1	1.35	5	6.95			2	2.78
Cerebro-spinal fever													1	1.39				
Malarial fever, intermittent	485	355.86	1	0.73			77	104.05					110	152.99				
Malarial fever, remittent	113	82.91			1	.73	8	10.81					95	132.13				
Malarial fever, pernicious							1	1.35					4	5.56				
Malarial cachexia	84	61.63	1	.73			6	8.11					7	9.74				
Fever, undetermined	61	44.76					3	4.05					3	4.17				
Erysipelas	1	.73					1	1.35										
Septicæmia and tetanus	2	1.47																
Rheumatic fever	3	2.20					4	5.41										
Consumption	7	5.14	3	2.20	1	.73							3	4.17	1	1.39		
Cancer							1	1.35			1	1.35	1	1.39				
Syphilis and results	13	9.54					1	1.35					4	5.56	1	1.39		
Gonorrhea and results	79	57.97					15	20.27					33	45.90	1	1.39		
Chancroid and results	37	27.15											25	34.77				
Infections, others	3	2.20					2	2.70										
Total infectious diseases	1,129	828.38	5	3.66	4	2.92	201	271.60			2	2.70	351	488.16	3	4.17	2	2.78
Anæmia	1	.73					2	2.70										
Nutrition, others	7	5.14	1	.73									1	1.39				
Total diseases of nutrition	8	5.87	1	.73			2	2.70					1	1.39				
Alcoholism	32	23.48					10	13.51			1	1.35	16	22.25				
Brain and spinal cord	7	5.14					8	10.81					1	1.39			1	1.39
Insanity			1	.73			1	1.35	1	1.35								

Meningitis	1	.73			1	.73							1	1.39				
Poisoning, narcotic													9	12.52				
Nervous system, others	45	33.02					18	24.32										
Total diseases of the nervous system	85	62.37	1	.73	1	.73	37	49.99	1	1.35	1	1.35	27	37.55			1	1.39
Poisoning, irritant													2	2.78				
Tonsillitis, pharyngitis, and sore throat	64	46.96					40	54.05					10	13.91				
Peritonitis	3	2.20			2	1.47	1	1.35			1	1.35						
Dyspepsia, colic, and constipation	139	101.98	1	.73			29	39.19					16	22.25				
Gastritis	18	13.21					13	17.57					18	25.04			1	1.39
Diarrheal diseases	386	283.20	1	.73	1	.73	74	100.00					262	364.40			1	1.39
Enteritis	4	2.93											44	61.20				
Perityphlitis and appendicitis	4	2.93					5	6.76					3	4.17				
Digestive system, others	88	64.57	1	.73			32	43.24			1	1.35	12	16.69				
Total diseases of the digestive system	706	517.98	3	2.19	3	2.20	194	262.16			2	2.70	367	510.44			2	2.78
Heart, diseases of	4	2.93	3	2.20			4	5.41			2	2.70	1	1.39				
Arteries and veins	4	2.93																
Total diseases of the circulatory system	8	5.86	3	2.20			4	5.41			2	2.70	1	1.39				
Bronchitis	201	147.47					58	78.37					6	8.34				
Pneumonia	13	9.54			3	2.20	1	1.35					3	4.17				
Pleurisy	4	2.93					1	1.35					3	4.17				
Respiratory system, others	51	37.42					27	36.48					12	16.69				
Total diseases of the respiratory organs	269	197.36			3	2.20	87	117.55					24	33.37				
Kidneys, diseases of	2	1.47	1	.73			2	2.70			1	1.35					1	1.39
Varicocele	4	2.93											1	1.39				
Genito-urinary, others	16	11.74					11	14.86					5	6.95				
Total diseases of the genito-urinary system	22	16.14	1	.73			13	17.56			1	1.35	6	8.34			1	1.39
Adenitis	6	4.40					1	1.35					3	4.17				
Lymphatic system, others	4	2.93											1	1.39				
Total diseases of the lymphatic system	10	7.33					1	1.35					4	5.56				
Rheumatism, muscular	114	83.64					59	79.73					11	15.30				
Osteitis and periostitis	2	1.47											1	1.39				
Arthritis and synovitis	17	12.47					10	13.51	1	1.35			1	1.39				
Rheumatism, chronic articular	17	12.47					5	6.76					2	2.78				
Muscles, bones, and joints, others	8	5.87					2	2.70					3	4.17				
Total diseases of the muscles, bones, and joints	158	115.92					76	102.70	1	1.35			18	25.03				

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

	Engineers.						Ordnance.						Signal Corps.					
Mean strength	1,363.						740.						719.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	126	92.45					23	31.08					31	43.12				
Total diseases of the eye	35	25.68	1	0.73			18	24.32					8	11.13	1	1.39		
Total diseases of the ear	9	6.60	4	2.93			3	4.05					5	6.95				
Total diseases of the nose							2	2.70										
Total unclassified	7	5.14											1	1.39				
Total for diseases	2,572	1,887.02	19	13.94	11	8.07	661	893.24	2	2.70	8	10.81	844	1,173.85	4	5.56	6	8.34
Drowning					1	.73												
Exhaustion from exposure and fatigue	10	7.34											4	5.56				
Heat stroke	3	2.20					1	1.35					1	1.39				
Venomous bites, stings, and wounds	15	11.01					3	4.05										
Abrasions, blisters, burns, and scalds	17	12.47					5	6.76					4	5.56				
Compression and concussion of brain							1	1.35					2	2.78			1	1.39
Contusions and sprains	96	70.44					53	71.62					11	15.30				
Dislocations	1	.73																
Fractures (not shot)	10	7.34					4	5.41			1	1.35	1	1.39			1	1.39
Hernia	9	6.60					4	5.41					1	1.39	1	1.39		
Wounds, contused, lacerated, and punctured	40	29.35					17	22.97	1	1.35			5	6.95				
Wounds, incised	15	11.01					7	9.46					4	5.56				
Wounds, gunshot	5	3.67					1	1.35					4	5.56			1	1.39
Secondary results of injury													1	1.39				
Other injuries	12	8.80					3	4.05					2	2.78				
Total for injuries	233	170.95			1	.73	99	133.78	1	1.35	1	1.35	40	55.63	1	1.39	3	4.17
Total for diseases and injuries	2,805	2,057.97	19	13.94	12	8.80	760	1,027.03	3	4.05	9	12.16	884	1,229.48	5	6.95	9	12.52

TABLE VI. *Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

	Medical.						Others.					
Mean strength	4,300.						3,566.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	5	1.16					2	0.56				
Measles	94	21.86					242	67.87	2	0.56	16	4.49
Smallpox	6	1.40			1	0.23	2	.56				
Vaccinia	58	13.49					328	91.98				
Influenza	192	44.65					74	20.75			1	.28
Dengue	66	15.35										
Mumps	33	7.67					80	22.44				
Diphtheria	6	1.40					4	1.12				
Typhoid fever	100	23.26			13	3.02	27	7.57			4	1.12
Yellow fever	20	4.65			4	.93	5	1.40			1	.28
Cerebro-spinal fever							6	1.68	1	.28	4	1.12
Malarial fever, intermittent	683	158.84					349	97.87				
Malarial fever, remittent	488	113.49			1	.23	40	11.22				
Malarial fever, pernicious	2	.47										
Malarial cachexia	46	10.70	5	1.16	1	.23	18	5.05	5	1.40		
Fever, undetermined	81	18.84					33	9.25				
Erysipelas	5	1.16					3	.84				
Septicæmia and tetanus	2	.47			1	.23						
Rheumatic fever	39	9.07					25	7.01	1	.28	1	.28
Consumption	26	6.05	16	3.72			13	3.65	5	1.40		
Cancer	1	.23					1	.28				
Syphilis and results	36	8.37	14	3.26			24	6.73	6	1.68		
Gonorrhea and results	251	58.37	3	.70			195	54.68	3	.84		
Chancroid and results	80	18.61	1	.23			50	14.02	1	.28		
Infections, others	6	1.40					12	3.37				
Total infectious diseases	2,326	540.96	39	9.07	21	4.87	1,533	429.90	24	6.72	27	7.57
Anæmia	8	1.86	2	.47			5	1.40				
Nutrition, others	4	.93					4	1.12	1	.28		
Total diseases of nutrition	12	2.79	2	.47			9	2.52	1	.28		
Alcoholism	58	13.49	2	.47	1	.23	40	11.22			1	.28
Brain and spinal cord	20	4.65	4	.93	1	.23	24	6.73	4	1.12	2	.56
Insanity	14	3.26	8	1.86			10	2.80	5	1.40		
Meningitis	1	.23					2	.56				

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

	Medical.						Others.					
Mean strength	4,300.						3,566.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Poisoning, narcotic	8	1.86	4	0.93	1	0.23						
Nervous system, others	123	28.61	7	1.63	......	......	33	9.25	3	0.84	......	......
Total diseases of the nervous system	224	52.10	25	5.82	3	.69	109	30.56	12	3.36	3	0.84
Poisoning, irritant	5	1.16	......	......	......	......	1	.28	......	......	......	......
Tonsillitis, pharyngitis, and sore throat	157	36.51	......	......	......	......	155	43.47	......	......	......	......
Peritonitis	1	.23	......	......	......	......	1	.28	......	......	......	......
Dyspepsia, colic, and constipation	187	43.49	......	......	......	......	140	39.26	......	......	......	......
Gastritis	137	31.86	1	.23	......	......	30	8.41	1	.28	......	......
Diarrheal diseases	629	146.28	3	.70	6	1.40	129	36.18	......	......	......	......
Enteritis	29	6.74	......	......	......	......	9	2.52	......	......	......	......
Perityphlitis and appendicitis	19	4.42	......	......	......	......	8	2.24	2	.56	1	.28
Digestive system, others	82	19.07	3	.70	3	.70	92	25.80	2	.56	......	......
Total diseases of the digestive system	1,246	289.76	7	1.63	9	2.10	565	158.44	5	1.40	1	.28
Heart, diseases of	18	4.19	9	2.09	2	.47	13	3.65	5	1.40	......	......
Arteries and veins	6	1.40	2	.47	......	......	6	1.68	2	.56	......	......
Total diseases of the circulatory system	24	5.59	11	2.56	2	.47	19	5.33	7	1.96	......	......
Bronchitis	158	36.75	......	......	......	......	166	46.55	......	......	......	......
Pneumonia	19	4.42	......	......	2	.47	32	8.97	......	......	6	1.68
Pleurisy	11	2.56	......	......	......	......	14	3.93	1	.28	......	......
Respiratory system, others	64	14.88	1	.23	......	......	36	10.09	2	.56	1	.28
Total diseases of the respiratory organs	252	58.61	1	.23	2	.47	248	69.54	3	.84	7	1.96
Kidneys, diseases of	12	2.79	4	.93	......	......	7	1.96	......	......	1	.28
Varicocele	11	2.56	......	......	......	......	8	2.24	......	......	......	......
Genito-urinary, others	35	8.14	......	......	......	......	15	4.21	1	.28	......	......
Total diseases of the genito-urinary system	58	13.49	4	.93	......	......	30	8.41	1	.28	1	.28

Adenitis	16	3.72					9	2.52				
Lymphatic system, others	3	.70					2	.56				
Total diseases of the lymphatic system	19	4.42					11	3.08				
Rheumatism, muscular	91	21.16					109	30.57	5	1.40		
Osteitis and periostitis	7	1.63					4	1.12	1	.28		
Arthritis and synovitis	18	4.19	1	.23			9	2.52				
Rheumatism, chronic articular	39	9.07	6	1.40			12	3.37	2	.56		
Muscles, bones, and joints, others	11	2.56					5	1.40				
Total diseases of the muscles, bones, and joints	166	38.61	7	1.63			139	38.98	8	2.24		
Total diseases of the integumentary system, all	196	45.58					123	34.49				
Total diseases of the eye	38	8.84	5	1.16			42	11.78	4	1.12		
Total diseases of the ear	28	6.51	1	.23	2	.47	22	6.17	3	.84		
Total diseases of the nose	4	.93					1	.28				
Total unclassified	11	2.56					18	5.05				
Total for diseases	4,604	1,070.70	102	23.72	39	9.07	2,869	804.54	68	19.07	39	10.94
Drowning					1	.23						
Exhaustion from exposure and fatigue	27	6.28					5	1.40				
Heat stroke	3	.70										
Lightning	1	.23										
Venomous bites, stings, and wounds	7	1.63					1	.28				
Abrasions, blisters, burns, and scalds	24	5.58					28	7.85				
Compression and concussion of brain	4	.93			1	.23	1	.28				
Contusions and sprains	108	25.12					120	33.65				
Dislocations	7	1.63					7	1.96	1	.28		
Fractures (not shot)	12	2.79			1	.23	12	3.37	2	.56		
Hernia	28	6.51	5	1.16			20	5.61	3	.84		
Wounds, contused, lacerated, and punctured	18	4.19					45	12.62				
Wounds, incised	19	4.42			1	.23	23	6.45				
Wounds, gunshot	25	5.81	1	.23	10	2.33	10	2.80	2	.56	2	.56
Secondary results of injury	7	1.63	2	.47			11	3.08	2	.56		
Other injuries	17	3.95			1	.23	17	4.77	2	.56	1	.28
Total for injuries	307	71.40	8	1.86	15	3.49	300	84.13	12	3.37	3	.84
Total for diseases and injuries	4,911	1,142.10	110	25.58	54	12.56	3,169	888.67	80	22.44	42	11.78

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered.*

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	20,051.						3,727.						39,280.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	8	0.40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Measles	546	27.23	....	....	5	0.25	61	16.37	....	....	1	0.27	767	19.53	....	....	1	0.03
Smallpox	5	.25	....	....	3	.15	7	1.88	....	....	....	....	267	6.80	....	....	78	1.99
Vaccinia	869	43.34	....	....	1	.05	191	51.25	....	....	....	....	1,354	34.47	1	0.03	....	....
Influenza	173	8.63	....	....	....	....	22	5.90	....	....	....	....	271	6.90	....	....	....	....
Dengue	84	4.19	....	....	....	....	73	19.59	....	....	....	....	1,421	36.18	....	....	....	....
Mumps	227	11.32	....	....	....	....	18	4.83	....	....	....	....	901	22.94	....	....	....	....
Diphtheria	2	.10	....	....	....	....	1	.27	....	....	....	....	32	.81	....	....	4	.10
Typhoid fever	790	39.40	2	0.10	85	4.24	56	15.03	....	....	10	2.68	862	21.95	9	.23	118	3.00
Yellow fever	247	12.32	....	....	51	2.54	....	....	....	....	....	....	....	....	....	....	....	....
Cerebro-spinal fever	7	.35	....	....	10	.50	1	.27	....	....	....	....	17	.43	1	.03	6	.15
Malarial fever, intermittent	14,636	729.94	2	.10	....	....	1,289	345.85	....	....	....	....	15,273	388.82	2	.05	....	....
Malarial fever, remittent	6,667	332.51	4	.20	5	.25	375	100.62	....	....	....	....	8,502	216.45	2	.05	8	.20
Malarial fever, pernicious	79	3.94	....	....	35	1.75	4	1.07	....	....	....	....	45	1.15	....	....	18	.46
Malarial cachexia	643	32.07	10	.50	10	.50	41	11.00	....	....	....	....	705	17.95	14	.36	9	.23
Fever, undetermined	837	41.75	....	....	....	....	45	12.07	....	....	....	....	1,455	37.04	....	....	....	....
Erysipelas	10	.50	....	....	....	....	1	.27	....	....	....	....	30	.76	....	....	4	.10
Septicæmia and tetanus	6	.30	....	....	4	.20	4	1.07	....	....	3	.80	7	.18	1	.03	1	.03
Rheumatic fever	126	6.28	2	.10	....	....	50	13.42	....	....	....	....	327	8.32	1	.03	2	.05
Consumption	90	4.49	40	1.99	8	.40	19	5.10	4	1.07	3	.80	176	4.48	60	1.53	31	.79
Cancer	6	.30	2	.10	....	....	1	.27	....	....	....	....	11	.28	1	.03	2	.05
Syphilis and results	332	16.56	41	2.04	....	....	114	30.59	16	4.29	....	....	461	11.74	43	1.09	....	....
Gonorrhea and results	1,763	87.92	9	.45	1	.05	636	170.64	5	1.34	....	....	2,372	60.39	6	.15	....	....
Chancroid and results	890	44.39	4	.20	....	....	317	85.06	....	....	....	....	1,754	44.65	1	.03	....	....
Infections, others	46	2.29	....	....	1	.05	8	2.15	....	....	....	....	48	1.22	1	.03	2	.05
Total infectious diseases	29,089	1,450.77	116	5.78	219	10.93	3,334	894.57	25	6.70	17	4.55	37,058	943.44	143	3.64	284	7.23
Anæmia	90	4.49	2	.10	....	....	13	3.49	....	....	....	....	223	5.68	1	.03	1	.03
Nutrition, others	16	.80	6	.30	3	.15	12	3.22	....	....	....	....	46	1.17	3	.08	1	.03
Total diseases of nutrition	106	5.29	8	.40	3	.15	25	6.71	....	....	....	....	269	6.85	4	.11	2	.06
Alcoholism	528	26.33	3	.15	9	.45	184	49.37	....	....	....	....	247	6.29	3	.08	8	.20

Brain and spinal cord	164	8.18	12	.60	5	.25	37	9.93	6	1.61	1	.27	232	5.91	26	.66	9	.23
Insanity	32	1.60	24	1.20			14	3.76	2	.54			84	2.14	16	.41		
Meningitis	6	.30			1	.05	1	.27	1	.27			11	.28	4	.10	6	.15
Poisoning, narcotic	11	.55	1	.05	5	.25	2	.54	1	.27			15	.38	3	.08	4	.10
Nervous system, others	564	28.13	14	.70			123	33.00					1,073	27.32	21	.53	3	.08
Total diseases of the nervous system	1,305	65.09	54	2.70	20	1.00	361	96.87	10	2.69	1	.27	1,662	42.32	73	1.86	30	.76
Poisoning, irritant	66	3.29			2	.10	10	2.68					48	1.22			2	.05
Tonsillitis, pharyngitis, and sore throat	509	25.39					113	30.32					915	23.29			2	.05
Peritonitis	10	.50			4	.20	3	.80			1	.27	18	.46			5	.13
Dyspepsia, colic, and constipation	1,995	99.49	2	.10			271	72.71					2,455	62.50	2	.05		
Gastritis	583	29.08			1	.05	174	46.69					1,672	42.57	4	.10	5	.13
Diarrheal diseases	8,709	434.35	10	.50	29	1.45	2,023	542.80	6	1.61	10	2.68	25,249	642.80	62	1.58	180	4.58
Enteritis	210	10.47			4	.20	43	11.54	1	.27	2	.54	677	17.23	4	.10	12	.31
Perityphlitis and appendicitis	52	2.59			8	.40	10	2.68					93	2.37	2	.05	7	.18
Digestive system, others	777	38.75	13	.65	6	.30	188	50.44					1,334	33.96	8	.20	13	.33
Total diseases of the digestive system	12,911	643.91	25	1.25	54	2.70	2,835	760.66	7	1.88	13	3.49	32,461	826.40	82	2.09	226	5.76
Heart, diseases of	133	6.63	40	1.99	4	.20	27	7.24	6	1.61	1	.27	223	5.68	43	1.09	13	.33
Arteries and veins	53	2.64	5	.25	1	.05	8	2.15	1	.27			106	2.70	9	.23	3	.08
Total diseases of the circulatory system	186	9.27	45	2.24	5	.25	35	9.39	7	1.88	1	.27	329	8.38	52	1.32	16	.41
Bronchitis	1,036	51.67	1	.05			168	45.08					1,786	45.47	5	.13		
Pneumonia	79	3.94			20	1.00	10	2.68			1	.27	137	3.49	2	.05	19	.48
Pleurisy	61	3.04			1	.05	14	3.76					155	3.95	3	.08	1	.03
Respiratory system, others	645	32.17	5	.25	2	.10	121	32.47					464	11.81	7	.18	5	.13
Total diseases of the respiratory organs	1,821	90.82	6	.30	23	1.15	313	83.99			1	.27	2,542	64.72	17	.43	25	.64
Kidneys, diseases of	51	2.54	3	.15	4	.20	13	3.49					104	2.65	3	.08	17	.43
Varicocele	111	5.54	3	.15			29	7.78	1	.27			183	4.66	5	.13		
Genito-urinary, others	341	17.01	7	.35			76	20.39	1	.27			474	12.07	3	.08		
Total diseases of the genito-urinary system	503	25.09	13	.65	4	.20	118	31.66	2	.54			761	19.38	11	.28	17	.43
Adenitis	108	5.39					107	28.71					257	6.54	1	.03		
Lymphatic system, others	26	1.30	3	.15			14	3.76					29	.74	1	.03		
Total diseases of the lymphatic system	134	6.69	3	.15			121	32.47					286	7.28	2	.05		
Rheumatism, muscular	1,084	54.06	4	.20			245	65.74	3	.80			1,840	46.84	14	.36		
Osteitis and periostitis	47	2.34	2	.10			16	4.29	1	.27			56	1.43				
Arthritis and synovitis	195	9.73					41	11.00					287	7.31	8	.20		
Rheumatism, chronic articular	159	7.93	13	.65			15	4.02	2	.54			496	12.63	34	.87		
Muscles, bones, and joints, others	56	2.79	8	.40			21	5.63	1	.27			106	2.70	16	.41		
Total diseases of the muscles, bones, and joints	1,541	76.85	27	1.35			338	90.68	7	1.88			2,785	70.91	72	1.83		

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	20,051.						3,727.						39,280.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	2,420	120.69	2	0.10			806	216.26					6,991	177.98	5	0.13	1	0.03
Total diseases of the eye	298	14.86	7	.35			48	12.88	3	0.80			529	13.47	19	.48		
Total diseases of the ear	202	10.07	20	1.00			38	10.19	1	.27			743	18.92	36	.92		
Total diseases of the nose	35	1.75					2	.54					18	.46	1	.03		
Total unclassified	338	16.86					34	9.12			1	.27	232	5.91				
Total for diseases	50,889	2,537.98	326	16.26	328	16.36	8,408	2,255.97	62	16.63	34	9.12	86,666	2,206.36	517	13.16	601	15.30
Drowning					9	.45					1	.27					78	1.99
Exhaustion from exposure and fatigue	46	2.29					5	1.34					1,331	33.89			3	.08
Heat stroke	71	3.54											120	3.06	2	.05		
Lightning	3	.15	1	.05	2	.10							4	.10				
Venomous bites, stings, and wounds	261	13.02					145	38.91					335	8.53				
Abrasions, blisters, burns, and scalds	465	23.19					68	18.25					543	13.82				
Compression and concussion of brain	7	.35			3	.15	6	1.61					9	.23				
Contusions and sprains	1,741	86.83	1	.05			397	106.52					1,317	33.53	5	.13		
Dislocations	61	3.04					17	4.56					52	1.32	1	.03		
Fractures (not shot)	129	6.43	8	.40	1	.05	64	17.17	2	.54	2	.54	188	4.79	10	.25		
Herniæ	156	7.78	34	1.70			38	10.19	8	2.15			382	9.72	35	.89	1	.03
Wounds, contused, lacerated, and punctured	637	31.77					120	32.20					476	12.12	2	.05	1	.03
Wounds, incised	363	18.10	1	.05	4	.20	49	13.15			3	.80	350	8.91	1	.03	14	.36
Wounds, gunshot	60	2.99	16	.80	16	.80	20	5.37			2	.54	2,053	52.26	118	3.00	495	12.60
Secondary results of injury	89	4.44	18	.90			19	5.10	1	.27			109	2.77	6	.15	1	.03
Other injuries	157	7.83	1	.05	4	.20	45	12.07	1	.27			161	4.10	3	.08	7	.18
Total for injuries	4,246	211.76	80	3.99	39	1.94	993	266.43	12	3.22	8	2.15	7,430	189.16	183	4.66	600	15.28
Total for diseases and injuries	55,135	2,749.74	406	20.25	367	18.30	9,401	2,522.40	74	19.85	42	11.27	94,096	2,395.52	700	17.82	1,201	30.58

discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered—Continued.

	Total, islands.						United States.					
Mean strength	63,058.						42,192.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number	Ratio.
Scarlet fever	8	0.13					14	0.33				
Measles	1,374	21.79			7	0.11	1,376	32.61	3	0.07	30	0.71
Smallpox	279	4.42			81	1.28	67	1.59			3	.07
Vaccinia	2,414	38.28	1	0.02	1	.02	4,470	105.94				
Influenza	466	7.39					5,164	122.39			5	.12
Dengue	1,578	25.03					24	.57				
Mumps	1,146	18.17					693	16.42				
Diphtheria	35	.56			4	.06	23	.55			1	.02
Typhoid fever	1,708	27.09	11	.17	213	3.38	458	10.85	13	.31	45	1.07
Yellow fever	247	3.92			51	.81	14	.33			3	.07
Cerebro-spinal fever	25	.40	1	.02	16	.25	38	.90	2	.05	25	.60
Malarial fever, intermittent	31,198	494.76	4	.06			10,035	237.84				
Malarial fever, remittent	15,544	246.50	6	.10	13	.21	1,619	38.37	1	.02	3	.07
Malarial fever, pernicious	128	2.03			53	.84	21	.50			5	.12
Malarial cachexia	1,389	22.03	24	.38	19	.30	598	14.17	81	1.92	1	.02
Fever, undetermined	2,337	37.06					352	8.34				
Erysipelas	41	.65			4	.06	51	1.21				
Septicæmia and tetanus	17	.27	1	.02	8	.13	8	.19				
Rheumatic fever	503	7.98	3	.05	2	.03	195	4.62	6	.14	1	.02
Consumption	285	4.52	104	1.65	42	.67	134	3.18	85	2.01	15	.36
Cancer	18	.29	3	.05	2	.03	4	.09	1	.02	1	.02
Syphilis and results	907	14.38	100	1.59			569	13.49	105	2.49		
Gonorrhea and results	4,771	75.66	20	.32	1	.02	3,683	87.29	37	.88		
Chancroid and results	2,961	46.96	5	.08			1,121	26.57	8	.19		
Infections, others	102	1.62	1	.02	3	.05	182	4.31	5	.12	1	.02
Total infectious diseases	69,481	1,101.89	284	4.53	520	8.25	30,913	732.67	347	8.22	139	3.29
Anæmia	326	5.17	3	.05	1	.02	162	3.84	12	.28		
Nutrition, others	74	1.17	9	.14	4	.06	52	1.23	12	.28		
Total diseases of nutrition	400	6.34	12	.19	5	.08	214	5.07	24	.56		
Alcoholism	959	15.21	6	.10	17	.27	568	13.46	1	.02	12	.28
Brain and spinal cord	433	6.87	44	.70	15	.24	232	5.50	56	1.33	5	.12
Insanity	130	2.06	42	.67			58	1.37	50	1.19		
Meningitis	18	.29	5	.08	7	.11	24	.57	1	.02	10	.24

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered*—Continued.

	Total, islands.						United States.					
Mean strength	63,058.						42,192.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Poisoning, narcotic	28	0.44	5	0.08	9	0.14	18	0.43	1	0.02	4	0.07
Nervous system, others	1,760	27.91	35	.56	3	.05	949	22.49	42	1.00	....	....
Total diseases of the nervous system	3,328	52.78	137	2.19	51	.81	1,849	43.82	151	3.58	31	.71
Poisoning, irritant	124	1.97	....	....	4	.06	90	2.13	....	....	2	.05
Tonsillitis, pharyngitis, and sore throat	1,537	24.37	....	....	2	.03	3,580	84.85	....	....	....	....
Peritonitis	31	.49	....	....	10	.16	19	.45	....	....	4	.09
Dyspepsia, colic, and constipation	4,721	74.87	4	.06	....	....	3,347	79.33	7	.17	....	....
Gastritis	2,429	38.52	4	.06	6	.10	532	12.61	6	.14	....	....
Diarrheal diseases	35,981	570.60	78	1.24	219	3.47	4,027	95.45	17	.40	7	.17
Enteritis	930	14.75	5	.08	18	.29	161	3.82	1	.02	2	.05
Perityphlitis and appendicitis	155	2.46	2	.03	15	.24	103	2.44	8	.19	1	.02
Digestive system, others	2,299	36.46	21	.33	19	.30	1,355	32.12	27	.64	6	.14
Total diseases of the digestive system	48,207	764.49	114	1.80	293	4.65	13,214	313.19	66	1.56	22	.52
Heart, diseases of	383	6.07	89	1.41	18	.29	177	4.20	56	1.33	13	.31
Arteries and veins	167	2.65	15	.24	4	.06	82	1.94	19	.45	1	.02
Total diseases of the circulatory system	550	8.72	104	1.65	22	.35	259	6.14	75	1.78	14	.33
Bronchitis	2,990	47.42	6	.10	....	....	5,381	127.54	6	.14	....	....
Pneumonia	226	3.58	2	.03	40	.63	401	9.50	7	.17	59	1.40
Pleurisy	230	3.65	3	.05	2	.03	182	4.31	6	.14	....	....
Respiratory system, others	1,230	19.51	12	.19	7	.11	2,573	60.98	13	.31	3	.07
Total diseases of the respiratory organs	4,676	74.16	23	.37	49	.77	8,537	202.34	32	.76	62	1.47
Kidneys, diseases of	168	2.66	6	.10	21	.33	75	1.78	13	.31	7	.17
Varicocele	323	5.12	9	.14	....	....	99	2.35	8	.19	....	....
Genito-urinary, others	891	14.13	11	.17	....	....	525	12.44	16	.38	....	....
Total diseases of the genito-urinary system	1,382	21.91	26	.41	21	.33	699	16.57	37	.88	7	.17

Adenitis	472	7.49	1	.02			213	5.05	1	.02		
Lymphatic system, others	69	1.09	4	.06			28	.66				
Total diseases of the lymphatic system	541	8.58	5	.08			241	5.71	1	.02		
Rheumatism, muscular	3,169	50.26	21	.33			2,444	57.93	35	.83		
Osteitis and periostitis	119	1.89	3	.05			81	1.92	5	.12		
Arthritis and synovitis	523	8.29	8	.13			360	8.53	11	.26		
Rheumatism, chronic articular	670	10.63	49	.78			278	6.59	46	1.09		
Muscles, bones, and joints, others	183	2.90	25	.40			155	3.67	21	.50		
Total diseases of the muscles, bones, and joints	4,664	73.97	106	1.69			3,318	78.65	118	2.80		
Total diseases of the integumentary system, all	10,217	162.03	7	.11	1	.02	2,753	65.25	12	.28		
Total diseases of the eye	875	13.88	29	.46			551	13.06	39	.92		
Total diseases of the ear	983	15.59	57	.90			343	8.13	35	.83	2	.05
Total diseases of the nose	55	.87	1	.02			88	2.09	2	.05		
Total unclassified	604	9.58			1	.02	176	4.17	1	.02		
Total for diseases	145,963	2,314.74	905	14.35	963	15.27	63.155	1,496.84	940	22.28	277	6.56
Drowning					88	1.40						
Exhaustion from exposure and fatigue	1,382	21.92			3	.05	92	2.18				
Heatstroke	191	3.03	2	.03			12	.28				
Lightning	7	.11	1	.02	2	.03						
Venomous bites, stings, and wounds	741	11.75					93	2.20				
Abrasions, blisters, burns, and scalds	1,076	17.06					628	14.88				
Compression and concussion of brain	22	.35			3	.05	18	.43	1	.02	2	.05
Contusions and sprains	3,455	54.79	6	.10			3,693	87.58	5	.12		
Dislocations	130	2.06	1	.02			113	2.68	3	.07		
Fractures (not shot)	381	6.04	20	.32	3	.05	290	6.87	18	.43	10	.24
Herniæ	576	9.13	77	1.22	1	.02	229	5.43	48	1.14		
Wounds, contused, lacerated, and punctured	1,233	19.55	2	.03	1	.02	1,158	27.45	1	.02	1	.02
Wounds, incised	762	12.08	2	.03	21	.33	550	13.04	4	.09		
Wounds, gunshot	2,133	33.83	134	2.13	513	8.14	142	3.37	92	2.18	25	.59
Secondary results of injury	217	3.44	25	.40	1	.02	148	3.51	12	.28		
Other injuries	363	5.76	5	.08	11	.17	455	10.78	13	.31	7	.17
Total for injuries	12,669	200.91	275	4.36	647	10.26	7,623	180.67	197	4.67	56	1.33
Total for diseases and injuries	158,632	2,515.65	1,180	18.71	1,610	25.53	70,778	1,677.51	1,137	26.95	333	7.89

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897.*

	Decade 1888–1897.											
	White troops.						Colored troops.					
ean strength	24,548.						2,342.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	49	0.20	......	......	......	......	......	......	......	......	......	......
Measles	1,453	5.92	......	......	1	0.004	64	2.73	......	......	......	......
Smallpox	21	.09	......	......	3	.01	4	.17	......	......	......	......
Vaccinia	7,913	32.24	1	0.004	......	......	553	23.61	......	......	......	......
Influenza	14,228	57.96	......	......	43	.18	1,766	75.41	......	......	4	0.17
Dengue	970	3.95	......	......	......	......	......	......	......	......	......	......
Mumps	1,154	4.70	......	......	......	......	193	8.24	......	......	......	......
Diphtheria	124	.51	......	......	2	.01	21	.90	......	......	......	......
Typhoid fever	1,273	5.19	3	.01	138	.56	69	2.95	......	......	10	.43
Yellow fever	7	.03	......	......	3	.01	......	......	......	......	......	......
Cerebro-spinal fever	12	.05	1	.004	5	.02	1	.04	......	......	......	......
Malarial fever, intermittent	16,353	66.62	......	......	......	......	598	25.53	......	......	......	......
Malarial fever, remittent	3,572	14.55	......	......	13	.05	272	11.61	......	......	6	.26
Malarial fever, pernicious	14	.06	......	......	6	.02	4	.17	......	......	2	.09
Malarial cachexia	644	2.66	16	.07	1	.004	82	3.50	1	0.04	......	......
Fever, undetermined	2,908	11.85	......	......	......	......	3.42	14.60	......	......	......	......
Erysipelas	446	1.82	......	......	14	.06	21	.90	......	......	3	.13
Septicæmia and tetanus	10	.04	......	......	10	.04	1	.04	......	......	1	.04
Rheumatic fever	1,180	4.81	12	.05	2	.01	107	4.57	......	......	......	......
Consumption	601	2.45	340	1.39	100	.41	83	3.54	42	1.79	24	1.02
Cancer	50	.20	7	.03	28	.11	4	.17	1	.04	1	.04
Syphilis and results	3,420	13.93	320	1.30	6	.02	392	16.74	61	2.60	1	.04
Gonorrhea and results	11,054	45.06	59	.24	......	......	942	40.23	2	.09	......	......
Chancroid and results	2,750	11.20	2	.01	......	......	378	16.14	......	......	......	......
Infections, others	563	2.29	19	.08	12	.05	40	1.71	2	.09	1	.04
Total infectious diseases	70,769	288.29	780	3.18	387	1.58	5,937	253.50	109	4.65	53	2.26
Anæmia	198	.81	13	.05	1	.004	11	.47	2	.09	......	......
Nutrition, others	300	1.22	102	.42	10	.04	26	1.11	10	.43	1	.04
Total diseases of nutrition	498	2.03	115	.47	11	.04	37	1.58	12	.51	1	.04

Alcoholism	8,568	34.91	11	.04	58	.24	114	4.87	1	.04		
Brain and spinal cord	1,237	5.04	188	.77	63	.26	84	3.59	14	.60	7	.30
Insanity	301	1.23	267	1.09	8	.03	16	.68	14	.60	1	.04
Meningitis	5	.02			2	.01						
Poisoning, narcotic	141	.57	14	.06	12	.05	5	.21	1	.01		
Nervous system, others	8,401	34.23	155	.63	4	.02	1,099	46.92	6	.26		
Total diseases of the nervous system	18,653	75.99	635	2.59	147	.60	1,318	56.28	36	1.54	8	.34
Poisoning, irritant	238	.97			51	.21	8	.34			1	.04
Tonsillitis, pharyngitis, and sore throat	15,757	64.19	2	.01	1	.004	1,813	77.41				
Peritonitis	59	.24	5	.02	20	.08	2	.09				
Dyspepsia, colic, and constipation	12,487	50.87	32	.13	1	.004	1,540	65.75	5	.21		
Gastritis	796	3.24	22	.09	12	.05	59	2.52	2	.09	2	.09
Diarrheal diseases	22,827	92.99	35	.14	15	.06	1,770	75.58	3	.13	2	.09
Enteritis	431	1.76	5	.02	16	.07	29	1.24				
Perityphlitis and appendicitis	122	.50	3	.01	10	.04	13	.56			2	.09
Digestive system, others	7,046	28.71	54	.22	51	.21	859	36.68	6	.26	3	.13
Total diseases of the digestive system	59,763	243.46	158	.64	177	.72	6,093	260.17	16	.69	10	.44
Heart, diseases of	1,134	4.62	292	1.19	84	.34	87	3.72	24	1.02	6	.26
Arteries and veins	316	1.29	84	.34	23	.09	14	.60	2	.09	8	.34
Total diseases of the circulatory system	1,450	5.91	376	1.53	107	.44	101	4.31	26	1.11	14	.60
Bronchitis	15,420	62.87	49	.20	4	.02	1,528	65.24	2	.09		
Pneumonia	832	3.39	12	.05	140	.57	153	6.53	2	.09	29	1.24
Pleurisy	478	1.95	15	.06	6	.02	72	3.07	1	.04	1	.04
Respiratory system, others	6,773	27.59	45	.18	14	.06	738	31.51	2	.09	4	.17
Total diseases of the respiratory organs	23,503	95.74	121	.49	164	.67	2,491	106.36	7	.31	34	1.45
Kidneys, diseases of	377	1.54	43	.18	57	.23	52	2.22	5	.21	7	.30
Varicocele	215	.88	37	.15			19	.81	2	.09		
Genito-urinary, others	1,643	6.69	76	.31	2	.01	235	10.03	8	.34		
Total diseases of the genito-urinary system	2,235	9.11	156	.64	59	.24	306	13.06	15	.64	7	.30
Adenitis	876	3.57	8	.03			110	4.70				
Lymphatic system, others	144	.59	5	.02	2	.01	14	.60				
Total diseases of the lymphatic system	1,020	4.16	13	.05	2	.01	124	5.29				
Rheumatism, muscular	11,002	44.84	141	.57			1,626	69.43	15	.64		
Osteitis and periostitis	171	.70	19	.08			22	.94	5	.21		
Arthritis and synovitis	717	2.92	113	.46			97	4.14	12	.51		
Rheumatism, chronic articular	3,384	13.79	172	.70	2	.01	589	25.15	20	.85		
Muscles, bones, and joints, others	724	2.95	80	.33	1	.004	77	3.29	8	.34	1	.04
Total diseases of the muscles, bones, and joints	15,998	65.18	525	2.14	3	.01	2,411	102.95	60	2.52	1	.04

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratio per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Decade 1888–1897.											
	White troops.						Colored troops.					
Mean strength	24,548						2,342					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	18,519	75.44	42	0.18	3	0.01	1,068	45.60	4	0.17	1	0.04
Total diseases of the eye	3,770	15.36	207	.84			584	24.94	20	.85		
Total diseases of the ear	1,690	6.88	123	.50	2	.01	77	3.29	5	.21		
Total diseases of the nose	435	1.77	29	.12	1	.004	25	1.07	2	.09		
Total unclassified	896	3.65	14	.06	3	.01	141	6.02			2	.09
Total for diseases	219,199	892.94	3,294	13.42	1,066	4.34	20,713	884.42	312	13.32	131	5.59
Drowning					134	.55					8	.34
Exhaustion from exposure and fatigue	286	1.17			4	.02	16	.68				
Heat stroke	503	2.05	6	.02	6	.02	20	.85	1	.04		
Lightning	2	.01			1	.004	1	.04				
Venomous bites, stings, and wounds	460	1.87	2	.01			47	2.01				
Abrasions, blisters, burns, and scalds	4,726	19.25	4	.02			292	11.61				
Compression and concussion of brain	147	.60	7	.03	15	.06	15	.64			2	.09
Contusions and sprains	30,164	122.88	58	.24	3	.01	3,108	132.71	4	.17	1	.04
Dislocations	633	2.58	23	.09	1	.004	43	1.84	3	.13		
Fractures (not shot)	1,623	6.61	121	.49	32	.13	129	5.51	6	.26	3	.13
Herniæ	588	2.40	220	.90	1	.004	64	2.73	21	.90		
Wounds, contused, lacerated, and punctured	7,425	30.25	33	.13	5	.02	976	41.68	4	.17		
Wounds, incised	3,936	16.04	21	.09	5	.02	440	18.79	1	.04	2	.09
Wounds, gunshot	661	2.69	142	.58	214	.87	121	5.17	14	.60	37	1.58
Secondary results of injury	543	2.21	68	.28			74	3.16	9	.38		
Other injuries	6,139	25.01	56	.23	101	.41	888	37.92	9	.38	3	.13
Total for injuries	57,836	235.61	761	3.10	522	2.13	6,214	265.35	72	3.07	56	2.39
Total for diseases and injuries	277,035	1,128.55	4,055	16.52	1,588	6.47	26,927	1,149.76	384	16.40	187	7.98

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Decade 1888–1897.											
	Indian troops.						Total army.					
Mean strength	227.						27,117.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							49	0.18				
Measles	8	3.52					1,525	5.62			1	0.004
Smallpox							25	.09			3	.01
Vaccinia	226	99.56					8,692	32.06	1	0.004		
Influenza	79	34.81					16,073	59.27			47	.17
Dengue							970	3.58				
Mumps	42	18.50					1,389	5.12				
Diphtheria							145	.53			2	.01
Typhoid fever	1	.44					1,343	4.95	3	.01	148	.55
Yellow fever							7	.03			3	.01
Cerebro-spinal fever							13	.05	1	.004	5	.02
Malarial fever, intermittent	66	29.08					17,017	62.76				
Malarial fever, remittent	4	1.76					3,848	14.19			19	.07
Malarial fever, pernicious							18	.07			8	.03
Malarial cachexia							726	2.68	17	.06	1	.004
Fever, undetermined	13	5.73					3,263	12.03				
Erysipelas	13	5.73					480	1.77			17	.06
Septicæmia and tetanus							11	.04			11	.04
Rheumatic fever	9	3.96	1	0.44			1,296	4.78	13	.05	2	.01
Consumption	54	23.79	26	11.41	16	7.04	738	2.72	408	1.50	140	.52
Cancer							54	.20	8	.03	29	.11
Syphilis and results	33	14.54	6	2.64			3,845	14.18	387	1.43	7	.03
Gonorrhea and results	149	65.64					12,145	44.79	61	.22		
Chancroid and results	26	11.45					3,154	11.63	2	.01		
Infections, others	21	9.25	2	.88			624	2.30	23	.08	13	.05
Total infectious diseases	744	327.75	35	15.37	16	7.04	77,450	285.62	924	3.41	456	1.68
Anæmia							209	.77	15	.06	1	.004
Nutrition, others	1	.44					327	1.21	112	.41	11	.04
Total diseases of nutrition	1	.44					536	1.98	127	.47	12	.04

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Decade 1888-1897.											
	Indian troops.						Total army.					
Mean strength	227.						27,117.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	10	4.41	....	....	....	....	8,692	32.06	12	0.04	58	0.21
Brain and spinal cord	3	1.32	1	0.44	1	0.44	1,324	4.88	203	.75	71	.26
Insanity	....	....	....	....	....	....	317	1.17	281	1.04	9	.03
Meningitis	....	....	....	....	....	....	5	.02	....	....	2	.01
Poisoning, narcotic	1	.44	....	....	....	....	147	.54	15	.06	12	.04
Nervous system, others	71	31.28	2	.88	....	....	9,571	35.30	163	.60	4	.01
Total diseases of the nervous system	85	37.45	3	1.32	1	.44	20,056	73.96	674	2.49	156	.58
Poisoning, irritant	....	....	....	....	....	....	246	.91	....	....	52	.19
Tonsillitis, pharyngitis, and sore throat	121	53.30	....	....	....	....	17,691	65.24	2	.01	1	.004
Peritonitis	....	....	....	....	....	....	61	.22	5	.02	20	.07
Dyspepsia, colic, and constipation	132	58.15	....	....	....	....	14,159	52.21	37	.14	1	.004
Gastritis	3	1.32	....	....	....	....	858	3.16	24	.09	14	.05
Diarrheal diseases	97	42.74	....	....	....	....	24,694	91.06	38	.14	17	.06
Enteritis	1	.44	....	....	....	....	461	1.70	5	.02	16	.06
Perityphlitis and appendicitis	....	....	....	....	....	....	135	.50	3	.01	12	.04
Digestive system, others	33	14.54	....	....	....	....	7,938	29.28	60	.22	54	.20
Total diseases of the digestive system	387	170.50	....	....	....	....	66,243	244.29	174	.64	187	.69
Heart, diseases of	5	2.20	2	.88	1	.44	1,226	4.52	318	1.17	91	.34
Arteries and veins	....	....	....	....	....	....	330	1.22	86	.32	31	.11
Total diseases of the circulatory system	5	2.20	2	.88	1	.44	1,556	5.74	404	1.49	122	.45
Bronchitis	121	53.30	....	....	....	....	17,069	62.94	51	.19	4	.01
Pneumonia	22	9.69	....	....	2	.88	1,007	3.71	14	.05	171	.63
Pleurisy	5	2.20	2	.88	....	....	555	2.05	18	.07	7	.03
Respiratory system, others	48	21.15	1	.44	....	....	7,559	27.88	48	.18	18	.07
Total diseases of the respiratory organs	196	86.34	3	1.32	2	.88	26,190	96.59	131	.49	200	.74

Kidneys, diseases of	......	......	......	......	......	......	429	1.58	48	.18	64	.24
Varicocele	......	......	......	......	......	......	234	.86	39	.14	......	......
Genito-urinary, others	16	7.05	1	.44	......	......	1,894	6.98	85	.31	2	.01
Total diseases of the genito-urinary system	16	7.05	1	.44	......	......	2,557	9.43	172	.63	66	.25
Adenitis	21	9.25	......	......	......	......	1,007	3.71	8	.03	......	......
Lymphatic system, others	3	1.32	......	......	......	......	161	.59	5	.02	2	.01
Total diseases of the lymphatic system	24	10.57	......	......	......	......	1,168	4.31	13	.05	2	.01
Rheumatism, muscular	81	35.69	......	......	......	......	12,709	46.87	156	.58	......	......
Osteitis and periostitis	1	.44	1	.44	......	......	194	.72	25	.09	......	......
Arthritis and synovitis	3	1.32	......	......	......	......	817	3.01	125	.46	......	......
Rheumatism, chronic articular	18	7.93	2	.88	......	......	3,991	14.72	194	.72	2	.01
Muscles, bones, and joints, others	5	2.20	1	.44	......	......	806	2.97	89	.33	2	.01
Total diseases of the muscles, bones, and joints	108	47.57	4	1.76	......	......	18,517	68.29	589	2.17	4	.02
Total diseases of the integumentary system	155	68.29	......	......	......	......	19,742	72.81	46	.17	4	.01
Total diseases of the eye	132	58.15	1	.44	......	......	4,486	16.54	228	.84	......	......
Total diseases of the ear	18	7.93	......	......	1	.44	1,785	6.58	128	.47	3	.01
Total diseases of the nose	4	1.76	......	......	......	......	464	1.71	31	.11	1	.004
Total unclassified	14	6.17	......	......	1	.44	1,051	3.88	14	.05	6	.02
Total for diseases	1,889	832.16	49	21.57	22	9.68	241,801	891.70	3,655	13.47	1,219	4.50
Drowning	......	......	......	......	1	.44	......	......	......	......	143	.53
Exhaustion from exposure and fatigue	......	......	......	......	......	......	302	1.11	......	......	4	.01
Heat stroke	......	......	......	......	......	......	523	1.93	7	.03	6	.02
Lightning	......	......	......	......	......	......	3	.01	......	......	1	.004
Venomous bites, stings, and wounds	3	1.32	......	......	......	......	510	1.88	2	.01	......	......
Abrasions, blisters, burns, and scalds	60	26.43	......	......	......	......	5,058	18.65	4	.01	......	......
Compression and concussion of brain	......	......	......	......	......	......	162	.60	7	.03	17	.06
Contusions and sprains	274	120.71	......	......	......	......	33,546	123.71	62	.23	4	.01
Dislocations	13	5.73	......	......	......	......	689	2.54	26	.10	1	.004
Fractures (not shot)	25	11.01	......	......	4	1.76	1,777	6.55	127	.47	39	.14
Herniæ	3	1.32	3	1.32	......	......	655	2.42	244	.90	1	.004
Wounds, contused, lacerated, and punctured	140	61.67	......	......	......	......	8,541	31.50	37	.14	5	.02
Wounds, incised	54	23.79	......	......	......	......	4,430	16.34	22	.08	7	.03
Wounds, gunshot	15	6.61	2	.88	11	4.84	797	2.94	158	.58	262	.97
Secondary results of injury	4	1.76	1	.44	......	......	621	2.29	78	.29	......	......
Other injuries	52	22.91	......	......	......	......	7,079	26.11	65	.24	104	.38
Total for injuries	643	283.28	6	2.64	16	7.04	64,693	238.57	839	3.09	594	2.19
Total for diseases and injuries	2,532	1,115.42	55	24.21	38	16.72	306,494	1,130.27	4,494	16.57	1,813	6.69

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	White troops.											
	1898.						1899.					
Mean strength	140,395.						98,635.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	47	0.33	......	......	7	0.05	21	0.21	......	......	......	......
Measles	7,258	51.70	7	0.05	70	.50	2,652	26.89	3	0.03	37	0.38
Smallpox	92	.66	......	......	23	.16	333	3.38	......	......	84	.85
Vaccinia	6,411	45.67	1	.01	......	......	6,503	65.91	1	.01	1	.01
Influenza	4,018	28.62	2	.01	......	......	5,271	53.44	......	......	4	.04
Dengue	191	1.36	......	......	2	.01	1,501	15.22	......	......	......	......
Mumps	2,018	14.37	2	.01	......	......	1,651	16.74	......	......	......	......
Diphtheria	57	.41	......	......	4	.03	57	.58	......	......	5	.05
Typhoid fever	20,719	147.58	44	.31	2,142	15.26	2,147	21.77	24	.24	249	2.52
Yellow fever	937	6.67	......	......	108	.77	254	2.58	......	......	54	.55
Cerebro-spinal fever	139	.99	9	.06	79	.56	60	.61	3	.03	35	.35
Malarial fever, intermittent	56,374	401.54	......	......	9	.06	38,124	386.51	3	.03	......	......
Malarial fever, remittent	24,846	176.94	25	.18	129	.92	16,810	170.42	7	.07	13	.13
Malarial fever, pernicious	464	3.31	5	.04	164	1.17	138	1.40	......	......	49	.50
Malarial cachexia	2,911	20.74	31	.22	20	.14	1,705	17.28	102	1.03	18	.18
Fever, undetermined	3,952	28.15	......	......	1	.01	2,648	26.85	......	......	......	......
Erysipelas	88	.63	......	......	......	......	83	.84	......	......	4	.04
Septicæmia and tetanus	22	.16	......	......	16	.11	24	.24	1	.01	7	.07
Rheumatic fever	615	4.38	10	.07	......	......	633	6.42	7	.07	3	.03
Consumption	513	3.65	160	1.14	37	.26	391	3.96	181	1.83	47	.48
Cancer	20	.14	2	.01	5	.04	23	.23	4	.04	3	.03
Syphilis and results	1,318	9.39	86	.61	4	.03	1,321	13.39	193	1.96	......	......
Gonorrhea and results	7,185	51.18	47	.33	1	.01	7,709	78.16	55	.56	1	.01
Chancroid and results	2,514	17.91	7	.05	......	......	3,654	37.04	12	.12	......	......
Infections, others	411	2.93	7	.05	6	.04	238	2.41	3	.03	3	.03
Total infectious diseases	143,120	1,019.41	445	3.17	2,827	20.13	93,951	952.48	599	6.06	617	6.25
Anæmia	492	3.50	6	.04	4	.03	478	4.85	15	.15	1	.01
Nutrition, others	536	3.82	24	.17	2	.01	121	1.23	19	.19	3	.03
Total diseases of nutrition	1,028	7.32	30	.21	6	.04	599	6.08	34	.34	4	.04

Alcoholism	1,257	8.95	24	.17	24	.17	1,490	15.11	7	.07	28	.28
Brain and spinal cord	979	6.97	88	.63	41	.29	557	5.65	95	.96	17	.17
Insanity	150	1.07	95	.68	3	.02	178	1.80	86	.87	....	....
Meningitis	66	.47	1	.01	31	.22	39	.40	6	.06	16	.16
Poisoning, narcotic	61	.43	7	.05	9	.06	44	.45	6	.06	12	.12
Nervous system, others	3,526	25.12	48	.34	7	.05	2,407	24.40	73	.74	2	.02
Total diseases of the nervous system	6,039	43.01	263	1.88	115	.81	4,715	47.81	273	2.76	75	.75
Poisoning, irritant	263	1.87	1	.01	11	.08	208	2.11	....	....	6	.06
Tonsillitis, pharyngitis, and sore throat	5,061	36.05	2	.01	1	.01	4,351	44.11	....	....	2	.02
Peritonitis	108	.77	....	....	27	.19	43	.44	....	....	14	.14
Dyspepsia, colic, and constipation	12,783	91.04	27	.19	4	.03	7,174	72.74	10	.10	....	....
Gastritis	2,808	20.00	9	.06	5	.04	2,813	28.52	10	.10	6	.06
Diarrheal diseases	56,192	400.24	65	.46	202	1.44	39,040	395.79	94	.95	222	2.25
Enteritis	3,008	21.43	5	.04	26	.19	972	9.85	6	.06	16	.16
Perityphlitis and appendicitis	345	2.46	12	.09	31	.22	248	2.51	9	.09	16	.16
Digestive system, others	6,063	43.19	52	.37	27	.19	3,352	33.98	46	.47	25	.25
Total diseases of the digestive system	86,631	617.05	173	1.23	334	2.39	58,201	590.05	175	1.77	307	3.10
Heart, diseases of	565	4.02	108	.77	32	.23	519	5.26	140	1.42	28	.28
Arteries and veins	235	1.67	29	.21	2	.01	240	2.43	31	.31	5	.05
Total diseases of the circulatory system	800	5.69	137	.98	34	.24	759	7.69	171	1.73	33	.33
Bronchitis	11,880	84.62	39	.28	2	.01	7,651	77.57	11	.11	....	....
Pneumonia	961	6.85	12	.09	123	.88	563	5.71	9	.09	91	.92
Pleurisy	531	3.78	7	.05	6	.04	370	3.75	9	.09	2	.02
Respiratory system, others	5,912	42.11	24	.17	6	.04	3,589	36.39	24	.24	9	.09
Total diseases of the respiratory organs	19,284	137.36	82	.59	137	.97	12,173	123.42	53	.53	102	1.03
Kidneys, diseases of	321	2.29	24	.17	21	.15	225	2.28	15	.15	27	.27
Varicocele	378	2.69	26	.19	....	....	414	4.20	16	.16	....	....
Genito-urinary, others	1,155	8.23	20	.14	3	.02	1,253	12.70	24	.24	....	....
Total diseases of the genito-urinary system	1,854	13.21	70	.50	24	.17	1,892	19.18	55	.55	27	.27
Adenitis	441	3.14	4	.03	....	....	636	6.45	2	.02	....	....
Lymphatic system, others	116	.83	3	.02	....	....	90	.91	4	.04	....	....
Total diseases of the lymphatic system	557	3.97	7	.05	....	....	726	7.36	6	.06	....	....
Rheumatism, muscular	7,536	53.68	72	.51	....	....	4,916	49.85	48	.49	....	....
Osteitis and periostitis	157	1.12	6	.04	....	....	184	1.87	7	.07	....	....
Arthritis and synovitis	862	6.14	28	.20	....	....	760	7.71	17	.17	....	....
Rheumatism, chronic articular	714	5.09	73	.52	1	.01	849	8.61	80	.81	....	....
Muscles, bones, and joints, others	328	2.34	35	.25	....	....	323	3.27	43	.44	....	....
Total diseases of the muscles, bones, and joints	9,597	68.37	214	1.52	1	.01	7,032	71.31	195	1.98	....	....

TABE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	White troops.											
	1898.						1899.					
Mean strength	140,395.						98,635.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	7,285	51.89	19	0.14	4	0.03	12,449	126.21	17	0.17	1	0.01
Total diseases of the eye	1,330	9.47	46	.33	....	....	1,276	12.94	60	.61	....	....
Total diseases of the ear	1,038	7.39	44	.31	3	.02	1,281	12.99	85	.86	2	.02
Total diseases of the nose	83	.59	6	.04	....	....	129	1.31	2	.02	....	....
Total unclassified	3,120	22.22	54	.38	44	.31	758	7.68	1	.01	1	.01
Total for diseases	281,766	2,006.95	1,590	11.33	3,529	25.14	195,941	1,986.51	1,726	17.50	1,169	11.85
Drowning	1	.01	....	....	32	.23	....	....	....	....	77	.78
Exhaustion from exposure and fatigue	1,398	9.96	9	.06	11	.08	1,455	14.75	....	....	....	....
Heat stroke	532	3.79	12	.09	8	.06	201	2.04	2	.02	....	....
Lightning	32	.23	....	....	5	.04	7	.07	1	.01	1	.01
Venomous bites, stings, and wounds	438	3.12	1	.01	....	....	800	8.11	....	....	....	....
Abrasions, blisters, burns, and scalds	1,862	13.26	1	.01	....	....	1,608	16.30	....	....	....	....
Compression and concussion of brain	81	.58	2	.01	6	.04	39	.40	....	....	5	.05
Contusions and sprains	7,004	49.89	28	.20	1	.01	6,399	64.88	10	.10	....	....
Dislocations	259	1.84	9	.06	1	.01	227	2.30	4	.04	....	....
Fractures (not shot)	756	5.39	25	.18	16	.11	630	6.39	37	.38	13	.13
Herniæ	1,012	7.21	166	1.18	2	.01	768	7.79	118	1.20	1	.01
Wounds, contused, lacerated, and punctured	1,940	13.82	6	.04	3	.02	2,139	21.69	3	.03	1	.01
Wounds, incised	1,107	7.88	2	.01	9	.06	1,181	11.97	6	.06	21	.21
Wounds, gunshot	1,766	12.58	110	.78	270	1.92	2,201	22.31	211	2.14	523	5.30
Secondary results of injury	164	1.17	21	.15	2	.01	313	3.17	34	.34	1	.01
Other injuries	1,108	7.89	13	.09	42	.30	669	6.78	16	.16	16	.16
Total for injuries	19,460	138.61	405	2.88	408	2.91	18,637	188.95	442	4.48	661	6.70
Total for diseases and injuries	301,226	2,145.56	1,995	14.21	3,937	28.05	214,578	2,175.47	2,168	21.98	1,830	18.55

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, and their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888-1897*—Continued.

	Colored troops.											
	1898.						1899.					
Mean strength	7,400.						6,911.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							1	0.14				
Measles	129	17.43					103	14.90				
Smallpox							14	2.03				
Vaccinia	505	68.24					392	56.73				
Influenza	224	30.27					359	51.95			1	0.14
Dengue	58	7.84					101	14.62				
Mumps	57	7.70					188	27.20				
Diphtheria	2	.27					1	.14				
Typhoid fever	207	27.97			50	6.70	37	5.35			9	1.30
Yellow fever	232	31.35			36	4.86	8	1.16			1	.14
Cerebro-spinal fever	1	.14					4	.58			6	.87
Malarial fever, intermittent	4,763	643.65	1	0.14			3,160	457.25	1	0.14		
Malarial fever, remittent	719	97.16			6	.81	392	56.73			3	.43
Malarial fever, pernicious	28	3.78			21	2.84	12	1.74			9	1.30
Malarial cachexia	311	42.03	1	.14			286	41.38	3	.43	2	.29
Fever, undetermined	200	27.03					41	5.93				
Erysipelas	6	.81			1	.14	9	1.30				
Septicæmia and tetanus							1	.14			1	.14
Rheumatic fever	58	7.84	4	.54	1	.14	65	9.41	2	.29		
Consumption	34	4.59	5	.68	1	.14	29	4.20	9	1.30	10	1.45
Cancer	1	.14			1	.14						
Syphilis and results	209	28.24	11	1.49			155	22.43	12	1.74		
Gonorrhea and results	498	67.29					759	109.82	3	.43		
Chancroid and results	400	54.05	3	.41			440	63.67	1	.14		
Infections, others	12	1.62			1	.14	46	6.66	3	.43	1	.14
Total infectious diseases	8,654	1169.44	25	3.40	118	15.91	6,603	955.46	34	4.90	43	6.20
Anæmia	8	1.08					10	1.45				
Nutrition, others	6	.81			1	.14	5	.72	2	.29	1	.14
Total diseases of nutrition	14	1.89			1	.14	15	2.17	2	.29	1	.14

Alcoholism	22	2.97	1	.14	......	......	39	5.64	......	......	1	.14
Brain and spinal cord	73	9.86	6	.81	1	.14	108	15.63	5	.72	3	.43
Insanity	9	1.22	3	.41	......	......	10	1.45	6	.87	......	......
Meningitis	1	.14	......	......	2	.27	3	.43	......	......	1	.14
Poisoning, narcotic	4	.54	......	......	......	......	3	.43	......	......	1	.14
Nervous system, others	225	30.40	2	.27	1	.14	306	44.28	4	.58	1	.14
Total diseases of the nervous system	334	45.13	12	1.63	4	.55	469	67.86	15	2.17	7	.99
Poisoning, irritant	2	.27	......	......	1	.14	8	1.16	......	......	......	......
Tonsillitis, pharyngitis, and sore throat	660	89.19	......	......	......	......	770	111.42	......	......	......	......
Peritonitis	......	......	......	......	......	......	7	1.01	......	......	......	......
Dyspepsia, colic, and constipation	626	84.59	......	......	......	......	904	130.81	1	.14	......	......
Gastritis	51	6.89	......	......	1	.14	154	22.28	......	......	......	......
Diarrheal diseases	1,244	168.11	......	......	12	1.62	1,140	164.96	1	.14	4	.58
Enteritis	124	16.76	......	......	1	.14	152	21.99	......	......	4	.58
Perityphilitis and appendicitis	17	2.30	1	.14	......	......	12	1.74	1	.14	......	......
Digestive system, others	373	50.40	3	.41	3	.41	311	45.00	2	.29	......	......
Total diseases of the digestive system	3,097	418.51	4	.55	18	2.45	3,458	500.37	5	.71	8	1.16
Heart, diseases of	47	6.35	5	.68	2	.27	41	5.93	5	.72	3	.43
Arteries and veins	6	.81	......	......	......	......	9	1.30	3	.43	......	......
Total diseases of the circulatory system	53	7.16	5	.68	2	.27	50	7.23	8	1.15	3	.43
Bronchitis	749	101.22	......	......	......	......	724	104.76	1	.14	......	......
Pneumonia	59	7.97	......	......	13	1.76	66	9.55	......	......	8	1.16
Pleurisy	27	3.65	......	......	......	......	44	6.37	......	......	......	......
Respiratory system, others	178	24.05	1	.14	2	.27	221	31.98	1	.14	1	.14
Total diseases of the respiratory organs	1,013	136.89	1	.14	15	2.03	1,055	152.66	2	.28	9	1.30
Kidneys, disease of	18	2.43	1	.14	2	.27	18	2.60	4	.58	1	.14
Varicocele	8	1.08	......	......	......	......	9	1.30	1	.14	......	......
Genito-urinary, others	118	15.94	4	.54	......	......	168	24.31	3	.43	......	......
Total diseases of the genito-urinary system	144	19.45	5	.68	2	.27	195	28.21	8	1.15	1	.14
Adenitis	32	4.32	1	.14	......	......	52	7.52	......	......	......	......
Lymphatic system, others	14	1.89	......	......	......	......	8	1.16	......	......	......	......
Total diseases of the lymphatic system	46	6.21	1	.14	......	......	60	8.68	......	......	......	......
Rheumatism, muscular	753	101.76	3	.41	......	......	702	101.59	8	1.16	......	......
Osteitis and periostitis	9	1.22	1	.14	......	......	16	2.32	1	.14	......	......
Arthritis and synovitis	61	8.24	1	.14	......	......	123	17.80	2	.29	......	......
Rheumatism, chronic articular	113	15.27	8	1.08	......	......	100	14.47	15	2.17	......	......
Muscles, bones, and joints, others	11	1.49	1	.14	......	......	15	2.17	3	.43	......	......
Total diseases of the muscles, bones, and joints	947	127.98	14	1.91	......	......	956	138.35	29	4.19	......	......

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various* [illegible] *per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Colored troops.											
	1898.						1899.					
Mean strength	7,400.						6,911.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	231	31.21	1	0.14	1	0.14	533	77.13	2	0.29	....	....
Total diseases of the eye	81	10.95	1	.14	....	....	151	21.85	9	1.30	....	....
Total diseases of the ear	26	3.51	3	.41	....	....	47	6.80	7	1.01	....	....
Total diseases of the nose	5	.68	....	....	....	....	14	2.03	1	.14	....	....
Total unclassified	37	5.00	....	....	....	....	23	3.33	....	....	....	....
Total for diseases	14,682	1,984.05	72	9.73	161	21.76	13,629	1,972.08	122	17.65	72	10.42
Drowning	....	....	....	....	3	.41	....	....	....	....	22	3.18
Exhaustion from exposure and fatigue	12	1.62	....	....	....	....	21	3.04	....	....	1	.14
Heat stroke	12	1.62	....	....	1	.14	3	.43	....	....	....	....
Lightning	....	....	....	....	....	....	....	....	....	....	1	.14
Venomous bites, stings, and wounds	11	1.49	....	....	....	....	34	4.92	....	....	....	....
Abrasions, blisters, burns, and scalds	58	7.84	....	....	....	....	99	14.33	....	....	....	....
Compression and concussion of brain	6	.81	....	....	....	....	1	.14	1	.14	....	....
Contusions and sprains	408	55.13	5	.68	....	....	759	109.82	1	.14	....	....
Dislocations	12	1.62	1	.14	....	....	16	2.32	....	....	....	....
Fractures (not shot)	34	4.59	3	.41	1	.14	41	5.93	1	.14	1	.14
Herniæ	38	5.13	5	.68	....	....	37	5.35	7	1.01	....	....
Wounds, contused, lacerated, and punctured	154	20.81	1	.14	....	....	255	36.90	....	....	1	.14
Wounds, incised	84	11.35	....	....	1	.14	134	19.39	....	....	....	....
Wounds, gunshot	191	25.81	4	.54	32	4.32	75	10.85	15	2.17	15	2.17
Secondary results of injury	19	2.57	....	....	....	....	53	7.67	3	.43	....	....
Other injuries	148	20.00	2	.27	....	....	150	21.71	2	.29	2	.29
Total for injuries	1,287	173.92	21	2.84	38	5.13	1,678	242.80	30	4.34	43	6.22
Total for diseases and injuries	15,969	2,157.97	93	12.57	199	26.89	15,307	2,214.88	152	21.99	115	16.64

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Total Army.											
	1898.						1899.					
Mean strength	147,795.						105,546.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	47	0.32	......	......	7	0.05	22	0.21	......	......	......	......
Measles	7,387	49.98	7	0.05	70	.47	2,755	26.10	3	0.03	37	0.35
Smallpox	92	.62	......	......	23	.16	347	3.29	......	......	84	.80
Vaccinia	6,916	46.80	1	.01	......	......	6,895	65.33	1	.01	1	.01
Influenza	4,242	28.70	2	.01	......	......	5,630	53.34	......	......	5	.05
Dengue	249	1.68	......	......	2	.01	1,602	15.18	......	......	......	......
Mumps	2,075	14.04	2	.01	......	......	1,839	17.42	......	......	......	......
Diphtheria	59	.40	......	......	4	.03	58	.55	......	......	5	.05
Typhoid fever	20,926	141.59	44	.30	2,192	14.83	2,184	20.69	24	.23	258	2.44
Yellow fever	1,169	7.91	......	......	144	.97	262	2.48	......	......	55	.52
Cerebro-spinal fever	140	.95	9	.06	79	.53	64	.61	3	.03	41	.39
Malarial fever, intermittent	61,137	413.67	1	.01	9	.06	41,284	391.15	4	.04	......	......
Malarial fever, remittent	25,565	172.98	25	.17	135	.91	17,202	162.98	7	.07	16	.15
Malarial fever, pernicious	492	3.33	5	.03	185	1.25	150	1.42	......	......	58	.55
Malarial cachexia	3,222	21.80	32	.22	20	.14	1,991	18.86	105	.99	20	.19
Fever, undetermined	4,152	28.09	......	......	1	.01	2,689	25.48	......	......	......	......
Erysipelas	94	.64	......	......	1	.01	92	.87	......	......	4	.04
Septicæmia and tetanus	22	.15	......	......	16	.11	25	.24	1	.01	8	.08
Rheumatic fever	673	4.55	14	.09	1	.01	698	6.61	9	.09	3	.03
Consumption	547	3.70	165	1.12	38	.26	420	3.98	190	1.80	57	.54
Cancer	21	.14	2	.01	6	.04	23	.22	4	.04	3	.03
Syphilis and results	1,527	10.33	97	.66	4	.03	1,476	13.98	205	1.94	......	......
Gonorrhœa and results	7,683	51.99	47	.32	1	.01	8,468	80.23	58	.55	1	.01
Chancroid and results	2,914	19.72	10	.07	......	......	4,094	38.79	13	.12	......	......
Infections, others	423	2.86	7	.05	7	.05	284	2.69	6	.06	4	.04
Total infectious diseases	151,774	1,026.94	470	3.19	2,945	19.94	100,554	952.70	633	6.01	660	6.27
Anæmia	500	3.38	6	.04	4	.03	488	4.62	15	.14	1	.01
Nutrition, others	542	3.67	24	.16	3	.02	126	1.19	21	.20	4	.04
Total diseases of nutrition	1,042	7.05	30	.20	7	.05	614	5.81	36	.34	5	.05

Alcoholism	1,279	8.65	25	.17	24	.16	1,529	14.49	[illegible]	[illegible]	[illegible]	[illegible]
Brain and spinal cord	1,052	7.12	94	.64	42	.28	665	6.30	100	.95	20	.19
Insanity	159	1.08	98	.66	3	.02	188	1.78	92	.87	......	......
Meningitis	67	.45	1	.01	33	.22	42	.40	6	.06	17	.16
Poisoning, narcotic	65	.44	7	.05	9	.06	47	.45	6	.06	13	.12
Nervous system, others	3,751	25.38	50	.34	8	.05	2,713	25.70	77	.73	3	.03
Total diseases of the nervous system	6,373	43.12	275	1.86	119	.79	5,184	49.12	288	2.74	82	.77
Poisoning, irritant	265	1.79	1	.01	12	.08	216	2.05	......	......	6	.06
Tonsillitis, pharyngitis, and sore throat	5,721	38.71	2	.01	1	.01	5,121	48.52	......	......	2	.02
Peritonitis	108	.73	......	......	27	.18	50	.47	......	......	14	.13
Dyspepsia, colic, and constipation	13,409	90.73	27	.18	4	.03	8,078	76.54	11	.10	......	......
Gastritis	2,859	19.35	9	.06	6	.04	2,967	28.11	10	.09	6	.06
Diarrheal diseases	57,436	388.62	65	.44	214	1.45	40,180	380.69	95	.90	226	2.14
Enteritis	3,132	21.19	5	.03	27	.18	1,124	10.65	6	.06	20	.19
Perityphlitis and appendicitis	362	2.45	13	.09	31	.21	260	2.46	10	.09	16	.15
Digestive system, others	6,436	43.55	55	.37	30	.20	3,663	34.71	48	.45	25	.24
Total diseases of the digestive system	89,728	607.12	177	1.19	352	2.38	61,659	584.20	180	1.69	315	2.99
Heart, disease of	612	4.14	113	.76	34	.23	560	5.31	145	1.37	31	.29
Arteries and veins	241	1.63	29	.20	2	.01	249	2.36	34	.32	5	.05
Total diseases of the circulatory system	853	5.77	142	.96	36	.24	809	7.67	179	1.69	36	.34
Bronchitis	12,629	85.46	39	.26	2	.01	8,375	79.35	12	.11	......	......
Pneumonia	1,020	6.90	12	.08	136	.92	629	5.96	9	.09	99	.94
Pleurisy	558	3.78	7	.05	6	.04	414	3.92	9	.09	2	.02
Respiratory system, others	6,090	41.21	25	.17	8	.05	3,810	36.10	25	.24	10	.09
Total diseases of the respiratory organs	20,297	137.35	83	.56	152	1.02	13,228	125.33	55	.53	111	1.05
Kidneys, diseases of	339	2.29	25	.17	23	.16	243	2.30	19	.18	28	.27
Varicocele	386	2.61	26	.18	......	......	423	4.01	17	.16	......	......
Genito-urinary, others	1,273	8.61	24	.16	3	.02	1,421	13.46	27	.26	......	......
Total diseases of the genito-urinary system	1,998	13.51	75	.51	26	.18	2,087	19.77	63	.60	28	.27
Adenitis	473	3.20	5	.03	......	......	688	6.52	2	.02	......	......
Lymphatic system, others	130	.88	3	.02	......	......	98	.93	4	.04	......	......
Total diseases of the lymphatic system	603	4.08	8	.05	......	......	786	7.45	6	.06	......	......
Rheumatism, muscular	8,289	56.09	75	.51	......	......	5,618	53.23	56	.53	......	......
Osteitis and periostitis	166	1.12	7	.05	......	......	200	1.89	8	.08	......	......
Arthritis and synovitis	923	6.25	29	.20	......	......	883	8.37	19	.18	......	......
Rheumatism, chronic articular	827	5.60	81	.55	1	.01	949	8.99	95	.90	......	......
Muscles, bones, and joints, others	339	2.29	36	.24	......	......	338	3.20	46	.44	......	......
Total diseases of the muscles, bones, and joints	10,544	71.35	228	1.55	1	.01	7,988	75.68	224	2.13	......	......

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

	Total Army.											
	1898.						1899.					
Mean strength	147,795.						105,546.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentory system, all	7,516	50.86	20	0.14	5	0.03	12,982	123.00	19	0.18	1	0.01
Total diseases of the eye	1,411	9.55	47	.32			1,427	13.52	69	.65		
Total diseases of the ear	1,064	7.20	47	.32	3	.02	1,328	12.58	92	.87	2	.02
Total diseases of the nose	88	.60	6	.04			143	1.35	3	.03		
Total unclassified	3,157	21.36	54	.37	44	.30	781	7.40	1	.01	1	.01
Total for diseases	296,448	2,005.80	1,662	11.25	36.90	24.97	209,570	1,985.58	1,848	17.51	12.41	11.76
Drowning	1	.01			35	.24					99	.94
Exhaustion from exposure and fatigue	1,410	9.54	9	.06	11	.07	1,476	13.98			3	.03
Heat stroke	544	3.68	12	.08	9	.06	204	1.93	2	.02		
Lightning	32	.22			5	.03	7	.07	1	.01	2	.02
Venomous bites, stings, and wounds	449	3.04	1	.01			834	7.90				
Abrasions, blisters, burns, and scalds	1,920	12.99	1	.01			1,707	16.17				
Compression and concussion of brain	87	.59	2	.01	6	.04	40	.38	1	.01	5	.05
Contusions and sprains	7,412	50.15	33	.22	1	.01	7,158	67.82	11	.10		
Dislocations	271	1.83	10	.07	1	.01	243	2.30	4	.04		
Fractures (not shot)	790	5.35	28	.19	17	.12	671	6.36	38	.36	14	.13
Herniæ	1,050	7.10	171	1.16	2	.01	805	7.63	125	1.18	1	.01
Wounds, contused, lacerated, and punctured	2,094	14.17	7	.05	3	.02	2,394	22.68	3	.03	2	.02
Wounds, incised	1,191	8.06	2	.01	10	.07	1,315	12.46	6	.06	21	.20
Wounds, gunshot	2,057	13.92	114	.77	302	2.04	2,276	21.56	226	2.14	538	5.10
Secondary results of injury	183	1.24	21	.14	2	.01	366	3.47	37	.35	1	.01
Other injuries	1,256	8.50	15	.10	42	.28	819	7.76	18	.17	18	.17
Total for injuries	20,747	140.38	426	2.88	446	3.02	20,315	192.48	472	4.47	704	6.67
Total for diseases and injuries	317,195	2,146.18	2,088	14.13	4,136	27.99	229,885	2,178.06	2,320	21.98	1,945	18.43

ABLE IX.—*Number of white and colored applicants for enlistment examined physically during the year 1899, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.*

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
xamined	64,303	1,000.00	6,008	1,000.00	70,311	1,000.00
ccepted	43,556	677.36	4,343	722.87	47,899	681.24
ejected	17,596	273.64	1,503	250.17	19,099	271.64
eclined	3,151	49.00	162	26.96	3,313	47.12

In addition to the foregoing, 35 Indians were examined, of whom 19 were enlisted as scouts and 10 r regular service; 6 rejected.

ABLE X.—*Nativity of white and colored recruits accepted during the year 1899, with ratios per thousand accepted.*

Nativity.	White.		Colored.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.
nited States	36,671	765.59	4,312	90.02	40,983	855.61
ngland	821	17.14	....	....	821	17.14
cotland	199	4.16	....	....	199	4.16
ales	46	.96	....	....	46	.96
reland	1,637	34.18	....	....	1,637	34.18
anada	546	11.40	7	0.15	553	11.55
ther British	104	2.17	13	.27	117	2.44
rance	44	.92	....	....	44	.92
elgium	17	.35	....	....	17	.35
olland	39	.81	....	....	39	.81
enmark	192	4.01	....	....	192	4.01
orway	129	2.69	....	....	129	2.69
weden	315	6.58	....	....	315	6.58
ermany	1,993	41.61	....	....	1,993	41.61
witzerland	140	2.92	....	....	140	2.92
ustria	207	4.32	....	....	207	4.32
ohemia	41	.86	1	.02	42	.88
ungary	32	.67	....	....	32	.67
oland	26	.54	....	....	26	.54
ussia	224	4.68	....	....	224	4.68
inland	15	.31	....	....	15	.30
taly	56	1.17	....	....	56	1.17
thers	62	1.29	10	.21	72	1.50
Total foreign	6,885	143.74	31	.65	6,916	144.39
Grand total	43,556	909.33	4,343	90.67	47,899	1,000.00

TABLE XI.—*Causes of rejection among 70,311 candidates for enlistment examined during the year 1899, with ratios per thousand examined.*

Number examined	White..... 64,303		Colored 6,008		Total....... 70,311	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Venereal diseases	973	15.13	222	36.95	1,195	17.00
Other infectious diseases	133	2.07	15	2.50	148	2.11
Diseases of nutrition, general	46	.72	2	.33	48	.68
Diseases of the nervous system	34	.53	1	.17	35	.50
Diseases of the digestive system	1,766	27.46	99	16.48	1,865	26.53
Diseases of the circulatory system	2,471	38.42	205	34.12	2,676	38.06
Diseases of the respiratory organs	102	1.59	7	1.17	109	1.55
Diseases of the genito-urinary system	1,487	23.12	90	14.98	1,577	22.43
Diseases of the lymphatic system and ductless glands	47	.73	7	1.17	54	.77
Diseases of the muscles, bones, and joints	162	2.52	19	3.16	181	2.57
Diseases of the integument and subcutaneous connective tissue	256	3.98	21	3.50	277	3.94
Diseases of the eye	2,742	42.64	171	28.46	2,913	41.43
Diseases of the ear	186	2.89	6	1.00	192	2.73
Diseases of the nose	62	.96	6	1.00	68	.97
Hernia	639	9.94	37	6.16	676	9.61
Other injuries	141	2.19	8	1.33	149	2.12
Overheight	3	.05	....	....	3	.04
Underheight	409	6.36	18	3.00	427	6.07
Overweight and obesity	42	.65	6	1.00	48	.68
Underweight	1,479	23.00	162	26.96	1,641	23.34
Imperfect physique	2,815	43.78	309	51.43	3,124	44.43
Mental insufficiency	30	.47	4	.67	34	.48
Over age	13	.20	2	.33	15	.21
Minor	257	4.00	6	1.00	263	3.74
Married or having dependent relatives	100	1.56	7	1.17	107	1.52
Illiteracy	42	.65	7	1.17	49	.70
Imperfect knowledge of English	10	.16	....	....	10	.14
Reenlistment disapproved for various reasons	11	.17	1	.17	12	.17
Character, bad or doubtful	213	3.31	6	1.00	219	3.12
Reference, none or unsatisfactory	34	.53	3	.50	37	.53
Aliens	8	.12	....	....	8	.11
General unfitness and undesirable	655	10.19	36	5.99	690	9.81
No vacancies	3	.05	3	.50	6	.09
Unclassified	225	3.50	17	2.83	242	3.44
Total	17,596	273.64	1,503	250.17	19,099	271.64

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1899.*

No.		White.	Colored.	Total.
1	Total number recruits examined	64,303	6,008	70,311
	Of each 1,000 of these—			
2	Were accepted for service	677.36	722.87	681.24
3	Were rejected for underheight	6.36	3.00	6.07
4	Were rejected for disabilities	267.28	247.17	265.57
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.34	.23	.33
6	61 to 62	.48	.69	.50
7	62 to 63	.99	1.84	1.07
8	63 to 64	9.62	10.36	9.69
9	64 to 65	107.54	110.52	107.66
10	65 to 66	137.39	147.82	138.33
11	66 to 67	175.54	178.45	175.81
12	67 to 68	178.97	181.44	179.19
13	68 to 69	154.70	150.36	154.30
14	69 to 70	109.67	102.69	109.04
15	70 to 71	67.34	61.94	66.85
16	71 to 72	34.30	33.39	34.22
17	72 to 73	14.95	12.44	14.72
18	73 to 74	5.90	5.99	5.91
19	74 upward	2.43	1.84	2.38
	Causes of rejection (exclusive of underheight), expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	.72	.33	.68
21	Tuberculosis of lungs or other organs	1.59	1.17	1.55
22	Imperfect vision	42.35	28.30	41.15
23	Heart disease	23.75	29.13	24.21
24	Goiter	.12	.17	.13
25	Varicose veins, varicocele, hemorrhoids	43.96	19.47	41.87
26	Hernia	9.94	6.16	9.61
27	Flat feet	1.82	3.99	2.01

NTERNATIONAL TABLE III.—*Movements of sick, by branches of military service and by months.*

VOLUNTEERS AND REGULARS, 1899.

	Absolute numbers.					Proportions per 1,000.			
			Sick disposed of.			In 1,000 of mean strength there were—		In 1,000 sick disposed of there were—[1]	
	Mean strength.	Sick admissions.	Total.[1]	As fit for duty (recovered).[1]	By death.	Total sick admissions.	Deaths.[1]	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
nfantry	71,750	160,629	....	....	1,520	2,238.73	21.19	....	....
avalry	11,870	33,213	....	....	170	2,798.06	14.32	....	....
Artillery	11,238	23,514	....	....	129	2,092.37	11.48	....	....
rdnance	740	760	....	....	9	1,027.03	12.16	....	....
Engineers	1,363	2,805	....	....	12	2,057.97	8.80	....	....
ignal Corps	719	884	....	....	9	1,229.48	12.52	....	....
Medical Department	4,300	4,911	....	....	53	1,142.10	12.33	....	....
All others	3,566	3,169	....	....	43	888.67	12.06	....	....
MONTH.									
anuary	158,596	30,175	....	....	164	190.27	....	....	1.03
February	137,339	23,094	....	....	247	168.15	....	....	1.80
March	123,266	22,867	....	....	241	185.51	....	....	1.95
April	104,028	16,473	....	....	182	158.35	....	....	1.75
May	85,934	16,254	....	....	132	189.14	....	....	1.54
June	80,227	15,872	....	....	136	197.84	....	....	1.70
July	88,504	16,719	....	....	140	188.90	....	....	1.58
August	91,920	18,161	....	....	137	197.58	....	....	1.49
September	99,079	16,305	....	....	118	164.56	....	....	1.19
October	101,711	18,633	....	....	141	183.19	....	....	1.39
November	97,794	17,958	....	....	143	183.64	....	....	1.46
December	98,156	17,374	....	....	164	177.01	....	....	1.67
VOLUNTEERS, 1898.									
ARM OF SERVICE.									
Infantry	93,744	199,010	....	....	2,675	2,122.91	28.54	....	....
Cavalry	2,750	8,218	....	....	109	2,988.36	39.64	....	....
Artillery	2,573	5,048	....	....	28	1,961.91	10.88	....	....
Ordnance	....	....	....	....	....	....	....	....	....
Engineers	1,504	3,850	....	....	28	2,559.84	18.62	....	....
Signal Corps	589	946	....	....	11	1,606.11	18.68	....	....
Medical Department	....	....	....	....	....	....	....	....	....
All others	....	....	....	....	....	....	....	....	....
MONTH.									
January	....	....	....	....	....	....	....	....	....
February	....	....	....	....	....	....	....	....	....
March	....	....	....	....	....	....	....	....	....
April	....	....	....	....	....	....	....	....	....
May	61,775	6,650	....	....	39	107.65	.63	....	....
June	150,813	24,813	....	....	96	164.53	.64	....	....
July	192,997	37,374	....	....	310	193.65	1.61	....	....
August	213,220	52,476	....	....	829	246.11	3.89	....	....
September	204,965	39,150	....	....	853	191.01	4.16	....	....
October	169,447	22,904	....	....	423	135.17	2.50	....	....
November	121,405	17,168	....	....	199	141.41	1.64	....	....
December	99,302	16,537	....	....	102	166.52	1.03	....	....

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[1] Information not tabulated.

INTERNATIONAL TABLE VI.—*Admissions of important diseases, by branches of military service.*

VOLUNTEERS AND REGULARS, 1899.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.							
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	931	150	292	10	32	16	58	40	12.98	12.64	25.98	13.51	23.48	22.25	13.49	11.22
2	Bronchitis, all[1]	5,438	1,216	1,132	58	201	6	158	166	75.79	102.44	100.72	78.37	147.47	8.34	36.75	46.55
3	Cholera asiatica																
4	Cholera nostras[2]																
5	Diphtheria et croup	38	4	6				6	4	.53	.34	.53				1.40	1.12
6	Dysenteria[2]																
7	Erysipelas	57	13	12	1	1		5	3	.79	1.10	1.07	1.35	.73		1.16	.84
8	Febris intermittens (malaria)	29,293	7,320	2,967	77	485	110	683	349	408.26	616.68	264.02	104.05	355.86	152.99	158.84	97.87
9	Febris recurrens	13,514	1,831	1,113	8	113	95	488	40	188.34	154.26	99.04	10.81	82.91	132.13	113.49	11.22
10	Gonorrhea	5,080	1,415	1,400	15	79	33	251	195	70.80	119.21	124.58	20.27	57.97	45.90	58.37	54.68
11	Hernia	584	63	96	4	9	1	28	20	8.14	5.31	8.54	5.41	6.60	1.39	6.51	5.61
12	Influenza	4,129	496	553	71	114	1	192	74	57.55	41.79	49.21	95.91	83.64	1.39	44.65	20.75
13	Insolatio (Hitzschlag, coup de chaleur)	166	10	20	1	3	1	3		2.31	.84	1.78	1.35	2.20	1.39	.70	
14	Meningitis cerebro-spinalis epidemica	31	2	5		1		1	2	.43	.17	.44		.73		.23	.56
15	Morbilli	1,995	127	266		21	10	94	242	27.80	10.70	23.67		15.41	13.91	21.86	67.87
16	Parotitis epidemica	1,510	112	92	1	8	3	33	80	21.05	9.44	8.19	1.35	5.87	4.17	7.67	22.44
17	Pneumonia crouposa sive lobaris	447	72	42	1	13	3	19	32	6.23	6.07	3.74	1.35	9.54	4.17	4.42	8.97
18	Rheumatismus articulorum	1,226	155	120	9	20	2	78	37	17.09	13.06	10.68	12.17	14.67	2.78	18.14	10.38
19	Scarlatina	15						5	2	.21						1.16	.56
20	Scorbutus																
21	Syphilis	942	223	233	1	13	4	36	24	13.13	18.79	20.73	1.35	9.54	5.56	8.37	6.73
22	Trachoma[2]																
23	Tuberculosis pulmonum	268	42	61		7	3	26	13	3.74	3.54	5.43		5.14	4.17	6.05	3.65
24	Tuberculosis ceterorum organorum[2]																
25	Typhus abdominalis	1,371	432	208	2	16	28	100	27	19.11	36.40	18.51	2.70	11.74	38.94	23.26	7.57
26	Typhus exanthematicus[2]																
27	Variola	302	8	27		1	1	6	2	4.21	.67	2.40		.73	1.39	1.40	.56
28	Morbi auris	926	170	165	3	9	5	28	22	12.91	14.32	14.68	4.05	6.60	6.95	6.51	6.17
29	Morbi cordis	360	95	65	4	4	1	18	13	5.02	8.00	5.78	5.41	2.93	1.39	4.19	3.65
30	Morbi cutis	8,844	2,021	1,618	23	126	31	196	123	123.26	170.26	143.98	31.08	92.45	43.12	45.58	34.49
31	Morbi mentis	122	22	19	1			14	10	1.70	1.85	1.69	1.35			3.26	2.80
32	Morbi oculi	882	214	190	18	35	8	38	42	12.29	18.03	16.91	24.32	25.68	11.13	8.84	11.78
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	1,380	329	249	13	22	6	58	30	19.23	27.71	22.15	17.56	16.14	8.34	13.49	8.41

VOLUNTEERS, 1898.

1	Alcoholismus acutus, including delirium tremens	516	3	20	......	25	8	......	......	5.40	1.09	7.77	......	16.62	13.58	......	......
2	Bronchitis, all[1]	7,405	162	215	......	133	20	......	......	78.99	58.91	83.56	......	88.41	33.96	......	......
3	Cholera asiatica	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
4	Cholera nostras[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
5	Diphtheria et croup	42	......	......	......	......	......	......	......	.45	......	......	......	......	......	......	......
6	Dysenteria[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
7	Erysipelas	58	......	2	......	7	......	......	......	.62	......	.78	......	4.65	......	......	......
8	Febris intermittens (malaria)	36,890	1,231	569	......	462	158	......	......	393.50	447.64	221.14	......	307.18	268.25	......	......
9	Febris recurrens	16,404	447	101	......	330	100	......	......	174.98	162.55	39.26	......	219.42	169.78	......	......
10	Gonorrhea	4,768	209	216	......	45	19	......	......	50.86	76.01	83.95	......	29.92	32.26	......	......
11	Hernia	709	26	22	......	33	5	......	......	7.56	9.45	8.55	......	21.94	8.49	......	......
12	Influenza	2,471	8	173	......	77	3	......	......	26.36	2.91	67.24	......	51.20	5.09	......	......
13	Insolatio (Hitzschlag, coup de chaleur)	273	10	2	......	4	6	......	......	2.91	3.64	.78	......	2.66	10.19	......	......
14	Meningitis cerebro-spinalis epidemica	53	......	1	......	......	......	......	......	.57	......	.39	......	......	......	......	......
15	Morbilli	6,058	106	44	......	6	3	......	......	64.62	38.55	17.10	......	3.99	5.09	......	......
16	Parotitis epidemica	1,811	20	27	......	5	......	......	......	19.32	7.27	10.49	......	3.32	......	......	......
17	Pneumonia crouposa sive lobaris	749	16	16	......	13	......	......	......	7.99	5.82	6.22	......	8.64	......	......	......
18	Rheumatismus articulorum	845	15	18	......	17	3	......	......	9.01	5.45	6.99	......	11.30	5.09	......	......
19	Scarlatina	33	1	1	......	......	......	......	......	.35	.36	.39	......	......	......	......	......
20	Scorbutus	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
21	Syphilis	972	32	35	......	14	4	......	......	10.37	11.64	13.60	......	9.31	6.79	......	......
22	Trachoma[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
23	Tuberculosis pulmonum	389	17	5	......	7	......	......	......	4.15	6.18	1.91	......	4.65	......	......	......
24	Tuberculosis ceterorum organorum[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
25	Typhus abdominalis	15,794	538	162	......	224	78	......	......	168.48	195.63	62.96	......	148.94	132.42	......	......
26	Typhus exanthematicus[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
27	Variola	68	......	1	......	......	4	......	......	.73	......	.39	......	......	6.79	......	......
28	Morbi auris	667	16	39	......	22	......	......	......	7.11	5.82	15.16	......	14.63	......	......	......
29	Morbi cordis	312	20	10	......	9	5	......	......	3.33	7.27	3.89	......	5.98	8.49	......	......
30	Morbi cutis	4,153	251	204	......	63	20	......	......	44.30	91.28	79.28	......	41.89	33.96	......	......
31	Morbi mentis	94	3	2	......	4	......	......	......	1.00	1.09	.78	......	2.66	......	......	......
32	Morbi oculi	852	46	27	......	25	5	......	......	9.09	16.73	10.49	......	16.62	8.49	......	......
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	1,301	69	44	......	30	5	......	......	13.88	25.49	17.10	......	19.94	8.49	......	......

---

[1] Acute not tabulated separately.

[2] Not tabulated separately.

INTERNATIONAL TABLE VII.—*Admissions of important diseases, by months (absolute numbers).*

VOLUNTEERS AND REGULARS, 1899.

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	174	138	149	133	115	101	124	111	115	109	151	109
2	Bronchitis, all[1]	2,097	1,461	1,185	654	495	326	294	308	322	358	434	441
3	Cholera asiatica												
4	Cholera nostras[2]												
5	Diphtheria et croup	6	4	4	1	8	6	8	7	8	4	2	
6	Dysenteria[2]												
7	Erysipelas	7	11	9	15	10	8	5	5	9	2	8	3
8	Febris intermittens (malaria)	5,193	4,480	4,188	2,838	1,927	1,825	2,256	3,101	3,112	3,594	4,203	4,567
9	Febris recurrens	2,279	1,533	1,962	1,145	1,141	949	1,063	1,355	1,157	1,583	1,642	1,393
10	Gonorrhea	1,067	860	848	651	661	574	579	620	572	684	670	662
11	Hernia	113	78	68	61	76	84	60	53	85	50	29	48
12	Influenza	3,059	1,275	732	128	55	45	32	59	68	47	53	77
13	Insolatio (Hitzschlag, coup de chaleur)	4	13	26	40	27	36	11	14	5	10	13	5
14	Meningitis cerebro-spinalis epidemica	18	5	1	7	3			3	1	2		2
15	Morbilli	826	417	335	230	271	132	52	62	96	72	25	237
16	Parotitis epidemica	283	290	320	156	149	91	91	130	85	93	61	90
17	Pneumonia crouposa sive lobaris	145	109	79	59	37	16	35	26	25	41	26	31
18	Rheumatismus articulorum	208	154	173	169	115	122	113	135	124	116	119	99
19	Scarlatina	9	9	2				2					
20	Scorbutus												
21	Syphilis	221	154	146	115	98	87	105	112	95	106	123	114
22	Trachoma[2]												
23	Tuberculosis pulmonum	49	32	38	23	37	31	36	41	34	36	31	32
24	Tuberculosis ceterorum organorum[2]												
25	Typhus abdominalis	215	194	209	243	195	218	175	161	233	125	110	106
26	Typhus exanthematicus[2]												
27	Variola	76	46	60	29	7	10	4	3	20	18	48	26
28	Morbi auris	123	109	101	79	122	125	122	122	109	125	101	90
29	Morbi cordis	63	47	44	40	48	25	41	69	41	54	40	45
30	Morbi cutis	780	699	767	799	951	959	1,153	1,342	1,334	1,269	1,358	1,571
31	Morbi mentis	17	12	13	17	12	18	16	17	11	19	21	12
32	Morbi oculi	173	137	130	109	118	111	75	132	125	95	107	112
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	275	217	190	144	139	163	170	197	185	165	128	114

VOLUNTEERS, 1898.

(Not organized until May.)

1	Alcoholismus acutus, including delirium tremens	......	......	......	......	11	24	63	67	101	93	98	115
2	Bronchitis, all[1]	......	......	......	......	457	761	1,087	974	964	951	1,230	1,511
3	Cholera asiatica	......	......	......	......	......	......	......	......	......	......	......	......
4	Cholera nostras[2]	......	......	......	......	......	......	......	......	......	......	......	......
5	Diphtheria et croup	......	......	......	......	6	13	2	7	4	2	6	2
6	Dysenteria[2]	......	......	......	......	......	......	......	......	......	......	......	......
7	Erysipelas	......	......	......	......	1	8	8	14	7	8	14	7
8	Febris intermittens (malaria)	......	......	......	......	365	2,362	5,623	11,423	8,630	4,859	3,526	2,522
9	Febris recurrens	......	......	......	......	46	511	2,045	5,084	4,665	2,339	1,498	1,194
10	Gonorrhea	......	......	......	......	204	564	883	835	714	724	706	627
11	Hernia	......	......	......	......	16	84	146	158	132	104	86	69
12	Influenza	......	......	......	......	155	229	228	121	137	257	212	1,393
13	Insolatio (Hitzschlag, coup de chaleur)	......	......	......	......	15	34	131	61	44	7	1	2
14	Meningitis cerebro-spinalis epidemica	......	......	......	......	2	8	7	16	10	4	3	4
15	Morbilli	......	......	......	......	285	1,343	1,716	1,492	570	319	260	232
16	Parotitis epidemica	......	......	......	......	42	292	300	342	310	168	183	226
17	Pneumonia crouposa sive lobaris	......	......	......	......	129	144	135	69	56	73	82	106
18	Rhematismus articulorum	......	......	......	......	17	91	145	173	154	113	94	111
19	Scarlatina	......	......	......	......	......	......	2	20	4	4	3	2
20	Scorbutus	......	......	......	......	......	......	......	......	......	......	......	......
21	Syphilis	......	......	......	......	11	98	142	164	155	162	171	154
22	Trachoma[2]	......	......	......	......	......	......	......	......	......	......	......	......
23	Tuberculosis pulmonum	......	......	......	......	9	60	66	76	59	45	48	55
24	Tuberculosis ceterorum organorum[2]	......	......	......	......	......	......	......	......	......	......	......	......
25	Typhus abdominalis	......	......	......	......	33	368	2,087	5,545	5,155	2,537	822	249
26	Typhus exanthematicus[2]	......	......	......	......	......	......	......	......	......	......	......	......
27	Variola	......	......	......	......	......	5	......	4	15	15	18	16
28	Morbi auris	......	......	......	......	35	104	132	141	115	94	50	73
29	Morbi cordis	......	......	......	......	18	39	65	60	63	49	29	33
30	Morbi cutis	......	......	......	......	219	716	974	999	624	382	338	439
31	Morbi mentis	......	......	......	......	3	23	24	20	11	9	3	10
32	Morbi oculi	......	......	......	......	102	180	170	138	107	93	78	87
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	......	......	......	......	51	153	276	248	246	156	169	150

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[1] Acute not tabulated separately.

[2] Not tabulated separately.

Respectfully submitted.

Geo. M. Sternberg,
Surgeon-General United States Army.

Hon. Elihu Root,
Secretary of War.

O

REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDING JUNE 30, 1901.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

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REPORT

OF

THE SURGEON-GENERAL.

War Department,
Surgeon-General's Office,
Washington, D. C., October 1, 1901.

Sir: In submitting a report of the administration of the duties of this office during the past year I have the honor, first, to invite attention to the financial transactions for the year ended June 30, 1901.

FINANCIAL STATEMENT, 1901.[1]

Medical and Hospital Department, 1901.

Appropriated by act approved May 26, 1900	$2,000,000.00	
Transferred from appropriation "Medical and Hospital Department, 1899," by act approved March 3, 1901	150,000.00	
		$2,150,000.00
Sale to Quartermaster's Department	70.00	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $45,957.94)	46,234.20	
		46,304.20
Total to be accounted for		2,196,304.20
Disbursed during the year:		
Expenses of medical supply depots	563.32	
Medical supplies	1,519,717.50	
Medical attendance and medicines	12,088.26	
Medical expenses of recruiting	37,825.95	
Pay of nurses	83,245.09	
Pay of other employees	141,963.87	
Washing of hospital linen	57,775.28	
Miscellaneous (notary fees, exchange, and expressage)	90.48	
		1,853,269.75
Transferred by Treasury settlement to adjust appropriations		2.67

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[1] The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

Balances on hand June 30, 1901:		
In United States Treasury and in transit thereto	$200,340.00	
In hands of disbursing officers—		
Washington	8,514.06	
St. Louis	19,642.45	
San Francisco	34,472.85	
St. Michael, Alaska	3,521.35	
Havana, Cuba	458.89	
Tientsin, China (Pekin relief expedition)	2,817.25	
Nagasaki, Japan (Pekin relief expedition)	4,631.97	
Manila, P. I	68,093.10	
Aparri, P. I	294.74	
Iloilo, P. I	240.56	
Vigan, P. I	4.56	
		$343,031.78
Total accounted for		2,196,304.20

Medical and hospital department, 1900.

Balances on hand July 1, 1900,[1] acts of March 3, 1899, and February 9, 1900		$445,463.89
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $526.62)		2,646.40
Total to be accounted for		448,110.29
Disbursed during the year:[2]		
Expenses of medical supply depots	$100.94	
Medical supplies	142,908.00	
Medical attendance and medicines	2,898.25	
Medical expenses of recruiting	2,821.65	
Pay of nurses	9,506.76	
Pay of other employees	3,769.19	
Washing of hospital linen	8,232.52	
Miscellaneous (notary fees and exchange)	286.42	
		170,523.73
Transferred by Treasury settlements to adjust appropriations		167,364.28
Balances on hand June 30, 1901:		
In United States Treasury	$105,403.81	
In hands of disbursing officers—		
Washington	4,117.82	
San Francisco	700.65	
		110,222.28
Total accounted for		448,110.29

Medical and hospital department, 1899.

Balances on hand July 1, 1900, acts of March 15, 1898, January 5, 1899, and March 3, 1899		$385,081.70
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $123,015.23)	$123,079.64	
Erroneous deposit on account of board of officer in hospital	24.00	
		123,103.64
Total to be accounted for		508,185.34

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[1] Including balance at Cebu, P. I., June 1, 1900, the June account from that station not having been received at date of last annual report.

[2] Including disbursements at Cebu, P. I., during June, 1900, not previously reported. See preceding note.

Disbursed during the year:		
Medical supplies	$1,677.87	
Medical attendance and medicines	3,764.83	
Medical expenses of recruiting	114.60	
Pay of nurses	1,544.51	
Pay of other employees	224.13	
Washing of hospital linen	297.30	
Exchange	519.39	
		$8,142.63
Treasury settlement to cancel erroneous deposit on account of board of officer in hospital		24.00
Transferred to appropriation "Medical and hospital department, 1901," by act approved March 3, 1901		150,000.00
Transferred to surplus fund		350,018.71
Total accounted for		508,185.34

Medical and hospital department, January 1, 1899.

Balances on hand July 1, 1900, acts of May 4, 1898, June 8, 1898, and July 7, 1898		$26,521.24
Refunded during the year		10.29
Total to be accounted for		26,531.53
Disbursed during the year:		
Medical supplies	$952.45	
Medical attendance	341.29	
Medical expenses of recruiting	32.40	
Pay of nurses	3.25	
		1,329.39
Transferred to surplus fund		25,202.14
Total accounted for		26,531.53

Medical and hospital department, certified claims.

Appropriated by act approved March 3, 1901	$8.50
Disbursed during the year	8.50

Appropriation for national defense, act of March 9, 1898.

Allotment by the President April 16, 1898:		
Balance on hand July 1, 1900		$5.51
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office		5.51
Reallotment by the President September 8, 1898:		
Balance on hand July 1, 1900		1,592.59
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office		1,592.59
Allotment by the President October 6, 1898:		
Balance on hand July 1, 1900		24,124.63
Refunded during the year		99.85
Total to be accounted for		24,224.48
Disbursed during the year:		
Medical attendance	$213.15	
Medical expenses of recruiting	88.40	
		301.55
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office		23,922.93
Total accounted for		24,224.48

Allotment by the President November 22, 1898:		
Balances on hand July 1, 1900		$21,481.68
Disbursed during the year:		
Medical supplies	$12.50	
Medical attendance	528.00	
Medical expenses of recruiting	421.40	
Washing of hospital linen	12.50	
		974.40
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office		20,507.28
Total accounted for		21,481.68

Reimbursement to contract nurses (traveling expenses).

Appropriated by act approved June 6, 1900	$4,000.00
Disbursed during the year	677.44
Balance in United States Treasury June 30, 1901	3,322.56
Total accounted for	4,000.00

Artificial limbs, 1901.

Appropriated by act approved June 6, 1900	$173,000.00
Disbursed during the year	156,814.61
Balance on hand June 30, 1901	16,185.39

Artificial limbs, 1900.

Balance July 1, 1900, act of March 3, 1899	$43,302.05
Disbursed during the year	6,968.05
Balance on hand June 30, 1901	36,334.00

Artificial limbs, 1899.

Balance July 1, 1900, act of July 1, 1898	$0.00
Refunded during the year	50.00
Total to be accounted for	50.00
Disbursed during the year	45.32
Balance on hand June 30, 1901	4.68
Total accounted for	50.00

Artificial limbs, certified claims.

Appropriated by act approved March 3, 1901	$860.21
Disbursed during the year	860.21

Appliances for disabled soldiers, 1901.

Appropriated by act approved June 6, 1900	$2,000.00
Disbursed during the year	1,454.52
Balance on hand June 30, 1901	545.48

Appliances for disabled soldiers, 1900.

Balance July 1, 1900, act of March 3, 1899	$979.50
Disbursed during the year	74.25
Balance on hand June 30, 1901	905.25

Appliances for disabled soldiers, 1899.

Balance July 1, 1900, act of July 1, 1898	$690.11
Transferred to surplus fund	690.11

Army Medical Museum, 1901.

Appropriated by act approved May 26, 1900	$5,000.00
Disbursed during the year	2,889.70
Balance on hand June 30, 1901	2,110.30

Army Medical Museum, 1900.

Balance July 1, 1900, act of March 3, 1899	$2,113.43
Disbursed during the year	1,453.00
Balance on hand June 30, 1901	660.43

Army Medical Museum, 1899.

Balance July 1, 1900, act of March 15, 1898	$14.80
Transferred to surplus fund	14.80

Library, Surgeon-General's Office, 1901.

Appropriated by act approved May 26, 1900	$10,000.00
Disbursed during the year	6,675.87
Balance on hand June 30, 1901	3,324.13

Library, Surgeon-General's Office, 1900.

Balance July 1, 1900, act of March 3, 1899	$1,224.63
Disbursed during the year	1,213.42
Balance on hand June 30, 1901	11.21

Furnishing trusses to disabled soldiers (sections 1176, 1177, and 1178, Revised Statutes, and act of March 3, 1879).

Expended during the year	$7,807.44

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the laws relating to artificial limbs there were furnished during the year ended June 30, 1901, 37 artificial legs, 2 arms, and 2 feet, while commutation certificates were issued and paid in the cases of 151 amputated legs, 113 amputated arms, 9 amputated feet, and 2,748 cases in which the loss of the use of a limb was regarded as proved by the evidence on file. These cases involved the expenditure of $156,814.61 from the appropriations available.

Under existing laws these benefits to disabled soldiers recur every three years, so that the claimants who were furnished with limbs or paid commutation during the past fiscal year are chiefly the survivors of the beneficiaries of the year ended June 30, 1898. The sum of $173,000 was estimated and appropriated for their benefit, of which, as stated above, $156,814.61 has been expended. For the current year 1901-1902 the sum of $125,000 was appropriated, which will probably suffice to meet the requirements of the survivors who were last paid in 1899.

During the year 1902–1903 the cases which were paid in the fiscal year ended June 30, 1900, will again require to be met, together with a series of new claimants resulting from disabilities incurred in the Spanish-American war and the Philippine insurrection. In the year ended June 30, 1900, the sum of $506,595.24 was expended. It is believed that the number of deaths that have occurred among these beneficiaries will be more than offset by claimants for disability from the war forces of the country in service since 1898, together with the increasing disabilities of the survivors of the Civil war. A careful consideration of the conditions indicates that the estimate for the year ending June 30, 1903, should be at least $514,000.

Since the commencement of the war with Spain, in April, 1898, 128 men disabled during and since that war have been furnished with or paid for 25 artificial arms, 43 legs, 1 foot, and commutation in 91 cases for the loss of the use of the limb. Twenty-five men lost 1 arm each; 42 1 leg; 1 lost 1 leg and the use of the other; 1 lost 1 foot. Twenty-three men lost the use of 1 arm; 2 the use of 1 arm and 1 leg; 2 the use of 1 arm and both legs; 3 the use of both arms; 13 the use of 1 leg, and 16 the use of both legs.

The following tabulation summarizes the disabilities which have been approved by this office and paid for from the appropriations made annually by Congress since June 17, 1870, to June 30, 1901. On the latter date there remained on the list of beneficiaries 13,200 cases, mostly veterans of the Civil war, with the exception of those mentioned in the preceding paragraph. Most of those marked dropped on the list were taken up again under additional disabilities.

Artificial limbs, apparatus, and commutation June 17, 1870, to June 30, 1901, inclusive.

Disabilities.	1870–1875.						1875–1880.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	4,724	1,966	172	1	2,139	2,585	152	55	8	....	63	89
1 arm and 1 leg	20	11	1	....	12	8	......	......	....	....	......	......
1 arm and use 1 arm	9	4	....	....	4	5	7	5	....	....	5	2
1 arm and use 1 arm and 2 legs	......	......	....	....	......	......	1	1	....	....	1	......
1 arm and use 1 leg	2	2	....	....	2	......	1	1	....	....	1	......
2 arms	32	16	1	....	17	15	......	......	....	....	......	......
2 arms and 2 legs	1	1	....	....	1	......	......	......	....	....	......	......
1 leg	4,659	1,734	157	3	1,894	2,765	148	60	10	....	70	78
1 leg and 1 foot	8	1	1	....	2	6	1	1	....	....	1	......
1 leg and 1 foot and use 2 arms	1	1	....	....	1	......	......	......	....	....	......	......
1 leg and use 1 arm	7	4	....	....	4	3	5	1	....	....	1	4
1 leg and use 2 arms	2	2	....	....	2	......	......	......	....	....	......	......
1 leg and use 1 leg	8	4	1	....	5	3	8	4	....	....	4	4
2 legs	45	18	3	....	21	24	......	......	....	....	......	......
1 foot	76	25	5	2	32	44	8	1	....	....	1	7
2 feet	15	9	2	....	11	4	2	......	1	....	1	1
Loss of use of—												
1 arm	1,740	734	87	31	852	888	794	311	47	40	398	396
1 arm and 1 leg	11	8	1	1	10	1	20	10	4	1	15	5
1 arm and 2 legs	2	2	....	....	2	......	5	3	1	1	5	......
2 arms	8	5	....	1	6	2	20	11	1	....	12	8
2 arms and 2 legs	1	......	....	....	......	1	14	14	....	....	14	......
1 leg	587	284	65	24	373	214	504	209	47	19	275	229
2 legs	31	13	2	3	18	13	57	35	12	....	47	10
Total	11,989	4,841	498	66	5,408	6,581	1,747	722	131	61	914	833

Artificial limbs, apparatus, and commutation, etc.—Continued.

Disabilities.	1880–1885.						1885–1890.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	103	42	3	....	45	58	53	16	....	....	16	37
1 arm and 1 leg	1	......	....	....	......	1	......	......	....	....	......	......
1 arm and use 1 arm	3	1	1	....	2	1	8	......	....	....	......	8
1 arm and use 1 leg	......	......	....	....	......	......	1	......	1	....	1	......
1 arm and use 2 legs	......	......	....	....	......	......	2	1	....	....	1	1
1 leg	122	33	5	1	39	83	146	45	2	2	49	97
1 leg and 1 foot	......	......	....	....	......	......	1	1	....	....	1	......
1 leg and use 1 arm	......	......	....	....	......	......	4	3	....	....	3	1
1 leg and use 1 arm and 1 leg	1	......	....	....	......	1	......	......	....	....	......	......
1 leg and use 1 leg	1	......	....	....	......	1	7	4	....	....	4	3
2 legs	4	3	....	....	3	1	2	1	....	....	1	1
1 foot	10	2	2	....	4	6	6	2	....	....	2	4
1 foot and use 1 leg	......	......	....	....	......	......	1	1	....	....	1	......
2 feet	5	1	....	....	1	4	1	......	....	....	......	1
Loss of use of—												
1 arm	1,937	521	64	157	742	1,195	1,374	309	25	75	409	965
1 arm and 1 leg	68	21	6	8	35	33	142	47	8	13	68	74
1 arm and 2 legs	21	11	3	2	16	5	24	10	1	2	13	11
2 arms	31	14	5	4	23	8	61	27	8	3	38	23
2 arms and 1 leg	6	3	1	....	4	2	10	9	1	....	10	......
2 arms and 2 legs	57	42	3	1	46	11	60	33	3	3	39	21
1 leg	1,393	447	104	149	700	693	1,302	350	63	91	504	798
2 legs	203	98	20	16	134	69	252	119	15	18	152	100
Total	3,966	1,239	217	338	1,794	2,172	3,457	978	127	207	1,312	2,145

Disabilities.	1890–1893.						1893–1896.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	29	5	....	....	5	24	8	......	....	....	......	8
1 arm and use 1 arm	1	......	....	....	......	1	1	......	....	....	......	1
1 arm and use 1 arm and 2 legs	1	......	....	....	......	1	......	......	....	....	......	......
1 arm and use 1 leg	1	......	....	....	......	1	1	......	....	....	......	1
1 arm and use 2 legs	......	......	....	....	......	......	1	......	....	....	......	1
1 leg	72	15	....	....	15	57	61	5	....	....	5	56
1 leg and use 1 arm	1	......	....	....	......	1	......	......	....	....	......	......
1 leg and use 1 arm and 1 leg	1	1	....	....	1	......	......	......	....	....	......	......
2 legs	1	......	....	....	......	1	2	1	....	....	1	1
1 foot	5	2	....	....	2	3	......	......	....	....	......	......
Loss of use of—												
1 arm	298	61	6	11	78	220	75	13	1	1	15	60
1 arm and 1 leg	85	25	2	2	29	56	22	8	1	....	9	13
1 arm and 2 legs	9	4	....	....	4	5	4	......	....	....	......	4
2 arms	19	7	2	....	9	10	6	1	1	....	2	4
2 arms and 1 leg	5	2	....	1	3	2	1	......	....	....	......	1
2 arms and 2 legs	32	14	1	2	17	15	18	9	....	....	9	9
1 leg	329	72	11	16	99	230	107	9	3	4	16	91
2 legs	99	37	6	7	50	49	49	15	....	4	19	30
Total	988	245	28	39	312	676	356	61	6	9	76	280

Artificial limbs, apparatus, and commutation, etc.—Continued.

Disabilities.	1896–1899.					1899–1902.				Recapitulation.					
	Allowed.	Died.	Dropped.	Casualties.	Remaining.	Allowed.	Died.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—															
1 arm	13	...	...	...	13	20	...	...	20	5,102	2,084	183	1	2,268	2,834
1 arm and 1 leg	...	...	...	...	...	...	...	...	...	21	11	1	...	12	9
1 arm and use 1 arm	...	...	...	...	...	...	...	...	...	29	10	1	...	11	18
1 arm and use 1 arm and 2 legs	...	...	...	...	...	...	...	...	...	2	1	...	...	1	1
1 arm and use 1 leg	...	...	...	...	...	...	...	...	...	6	3	1	...	4	2
1 arm and use 2 legs	...	...	...	...	...	...	...	...	...	3	1	...	...	1	2
2 arms	...	...	...	...	...	...	...	...	...	32	16	1	...	17	15
2 arms and 2 legs	...	...	...	...	...	...	...	...	...	1	1	...	...	1	...
1 leg	6	1	...	1	5	40	...	...	40	5,254	1,893	174	6	2,073	3,181
1 leg and 1 foot	...	...	...	...	...	...	...	...	...	10	3	1	...	4	6
1 leg and 1 foot and use 2 arms	...	...	...	...	...	...	...	...	...	1	1	...	...	1	...
1 leg and use 1 arm	...	...	...	...	...	...	...	...	...	17	8	...	...	8	9
1 leg and use 1 arm and 1 leg	...	...	...	...	...	...	...	...	...	2	1	...	...	1	1
1 leg and use 2 arms	...	...	...	...	...	...	...	...	...	2	2	...	...	2	...
1 leg and use 2 arms and 1 leg	1	...	...	...	1	...	...	...	...	1	...	...	...	...	1
1 leg and use 1 leg	...	...	...	...	...	...	...	...	...	24	12	1	...	13	11
2 legs	1	...	...	...	1	1	...	...	1	56	23	3	...	26	30
1 foot	2	1	...	1	1	...	...	...	...	107	33	7	2	42	65
1 foot and use 1 leg	...	...	...	...	...	...	...	...	...	1	1	...	...	1	...
2 feet	...	...	...	...	...	...	...	...	...	23	10	3	...	13	10
Loss of use of—															
1 arm	93	4	...	4	89	41	...	...	41	6,352	1,953	230	315	2,498	3,854
1 arm and 1 leg	20	...	...	...	20	6	...	...	6	374	119	22	25	166	208
1 arm and 2 legs	4	...	...	...	4	5	1	1	4	74	31	5	5	41	33
2 arms	5	...	1	1	4	3	...	...	3	153	65	18	8	91	62
2 arms and 1 leg	2	...	...	...	2	1	...	...	1	25	14	2	1	17	8
2 arms and 2 legs	10	1	...	1	9	10	...	...	10	202	113	7	6	126	76
1 leg	111	6	3	9	102	75	...	...	75	4,408	1,377	296	303	1,976	2,432
2 legs	40	7	...	7	33	28	...	...	28	759	324	55	48	427	332
Total	308	20	4	24	284	230	1	1	229	23,041	8,110	1,011	720	9,841	13,200

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,528.77 was expended for 192 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 1,054, at a cost of $7,807.44.

PROVIDENCE HOSPITAL.

The act of Congress approved June 6, 1900, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with this hospital by the Surgeon-General of the Army. The relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1900	135
Admitted during the year	1,576
Total number treated	1,711
Average number admitted per month	142
Number remaining in hospital June 30, 1901	102
Total number of days' treatment afforded	46,794
Average number of days' treatment per patient	41
Average number of patients treated per day	128
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	23

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

Officers' division.—Three officers remained under treatment December 31, 1899—2 on the active army list and 1 on the navy retired list. Twenty-four were admitted during the calendar year 1900—Regular Army 9, Volunteer Army 2, army retired list 5, navy active list 5, and navy retired list 3. Twenty-seven officers were therefore treated during the year, against the same number in the year 1899. Twenty-one were returned to duty, or returned to residence much benefited by their treatment in the hospital; an average of 69.52 days, ranging from 4 days to 155 days. The maximum number treated at one time was 10, in December, 1900; the minimum 2, in September, 1900. Of the 6 remaining under treatment December 31, 1900, 4 belonged to the Regular Army, 1 to the Volunteer Army, and 1 to the navy retired list.

Enlisted men's division.—In this division there remained under treatment December 31, 1899, 58 men—42 belonging to the Regular Army and 16 ex-volunteers. Three hundred and eleven cases were entered for treatment, making the whole number treated during the year 369. Two hundred and nine of these cases consisted of rheumatism in its various forms, 61 diseases of the digestive system, 25 diseases of the nervous system, 27 malarial fevers and cachexia, and 47 other disabilities.

Eighty-one of the men were discharged on certificates of disability, 30 on expiration of term of service or by order of the War Department, 50 remained under treatment December 31, 1900—enlisted men 41, ex-volunteers 9—and 208 were returned to duty or, if ex-volunteers, returned to their homes very much improved.

THE UNITED STATES GENERAL HOSPITAL FOR THE TREATMENT OF PULMONARY TUBERCULOSIS AT FORT BAYARD, N. MEX.

In October, 1899, Fort Bayard, N. Mex., was, on my recommendation, discontinued as a military post, and its buildings were transferred to the Medical Department of the Army for conversion into a sanatorium or hospital for the treatment of cases of pulmonary consumption. As the abandonment of the post had been in contemplation for some years, the buildings were in poor condition and required many repairs and improvements to fit them for hospital use. These were speedily effected, and the hospital is now in excellent condition. The selection of Fort Bayard as a site for a sanatorium has been amply justified by the results. Its location in the dry mountainous region of southern New Mexico, at an altitude of 6,040 feet, affords a climate permitting comfortable outdoor life during the entire year. The mean maximum and minimum temperatures and the precipitation for the past decade were as follows:

Month.	Mean maximum.	Mean minimum.
	°	°
January	52.77	23.15
February	54.13	25.83
March	60.52	30.92
April	68.43	37.10
May	77.33	45.45
June	86.45	52.68
July	82.91	55.34
August	85.32	56.98
September	81.97	52.09
October	71.34	41.20
November	61.29	31.90
December	53.20	24.66
General average	69.56	39.79

During the year 1900 only 52 cloudy days were noted.

Precipitation.

	Inches.		Inches.
1891	19.30	1896	18.85
1892	8.89	1897	18.00
1893	15.47	1898	15.91
1894	9.12	1899	10.43
1895	15.09	1900	12.66

The following is from the report of Maj. D. M. Appel, surgeon, United States Army, in command of this Hospital:

Instructions to patients.—Consumption is an infectious disease caused by a germ which is found in the spit, therefore the spit, together with everything coughed up by patients, must be carefully destroyed. Should it be allowed to dry and in the form of dust float around in the air, millions of these germs would be set free, and would endanger not only those who are well, but would often reinfect the sick, and thus undo the benefit derived from months of care.

Spit only in your spit cup or into the large spittoons provided for that purpose; never on the floor, in the bath tubs, sinks, or closets, nor in your handkerchiefs.

Carry your own spit cup with you everywhere, spit into it carefully, to avoid having to wipe your lips, whiskers, or the edges or sides of your cup. Never swallow your spit.

The only safe method of disposing of the spit is by burning it, therefore the paper cups and spittoons must be burned when half filled and the frames washed frequently with carbolic solution. Should you by accident spit on the floor or bedclothes or spill your cup, report it at once to insure proper disinfection.

To be benefited by this most excellent climate you must live outdoors as much as possible, and always when indoors keep the windows open.

Go to bed early; take moderate exercise when not instructed to the contrary; eat your meals slowly and chew your food thoroughly.

Do not help yourself to food from any dish except your own plate with your own fork or spoon, but use those provided for that purpose. Try to refrain from coughing at meals. You can with slight effort do much to prevent it.

The use of stimulants and cigarettes is forbidden. Smoking and chewing tobacco in moderation is permitted. Whiskers and mustaches must be closely trimmed.

Patients not bedridden must observe the following rules:

1. They must occupy their quarters only from 7.30 p. m. until 8 a. m.
2. They must make their own beds and neatly arrange their personal belongings, none of which are to be left on the floors.
3. They must stay outdoors at least 8 hours daily.
4. They must not visit in quarters.
5. They must bathe at least once a week.

* * * * * * *

Each patient is provided with a spit cup of the pattern made by Seabury & Johnson, consisting of a tin frame with spring cover, in which is placed an impervious paper receptacle, and large covered spittoons with paper receptacles are scattered throughout the rooms and on the porches frequented by the patients. A shelf is fitted under each chair in the dining rooms, on which the spit cup is placed during meals. The spit cups, and also the dejecta from patients with intestinal tuberculosis, are destroyed in crematories, four of which are now in use.

Abundant good and nutritious food is provided, and the dairy furnishes an ample supply of milk. Patients are weighed every Friday. The weights are recorded, and the report of the gains and losses affords a good index of progress.

The old post hospital is occupied as an infirmary for bedridden cases, including not only those in which the disease is far advanced, but all febrile patients whose maximum daily temperature reaches 101° F. In a large majority of these cases, after a short period of absolute rest, the fever permanently subsides.

The treatment pursued consists mainly of outdoor life, ample good food, and rest. Regulated exercise is permitted when advisable. The ambulant cases are daily instructed in breathing exercises. Cod-liver oil with guaiacol is extensively administered, and in some cases guaiacol carbonate is prescribed in 1-gram doses twice daily. The laryngeal lesions, as a rule, do well with a simple spray of 1 per cent tricresol in liquid vaseline, which apparently prevents pyogenic infection, and the tuberculous lesion improves with the general condition. Otherwise the treatment is symptomatic. Tuberculin is used only for diagnostic purposes.

From October 3, 1899, to December 31, 1900, 283 patients were admitted, as follows:

Officers (including 1 retired)	6
Enlisted men, Regular Army (of whom 114 remained, after discharge from service, as beneficiaries of the Soldiers' Home, and 1 after retirement)	196
Discharged soldiers, as beneficiaries of the Soldiers' Home	49
Enlisted men, volunteers	23
Discharged volunteers, by special authority	2
Acting assistant surgeons, assigned to duty at hospital	2
Civilian clerk, assigned to duty at hospital	1
Civilian clerk, temporary admission authorized by Surgeon-General	1
Civilian residing at post	1
Female nurses	2
Total	283

Of the 283 patients admitted, 124 were discharged, 34 died, and 125 remained under treatment.

To elucidate the results better, the cases are divided into three classes, viz: (1) Cases exhibiting permanent afebrility, without tubercle bacilli in the sputum; (2) cases exhibiting permanent or approximately permanent afebrility, with tubercle bacilli (pure tuberculosis or a minor degree of mixed infection); (3) cases exhibiting permanent febrility, with tubercle bacilli (mixed infection).

Certain features common to all these cases are worthy of emphasis. The first and most striking is the apparent permanency of the different types. Cases in which the maximum daily temperature does not drop below 100° F. shortly after admission usually remain permanently febrile. These are true cases of phthisis pulmonalis, and the results in this class are no better than in less favorable climates. Cases afebrile on admission, or those where, following absolute rest, the temperature drops below the febrile point shortly after admission, also exhibit great permanency of type, and the same is true of the remaining class, viz, febrile cases without tubercle bacilli. In these last two types favorable results may be anticipated, especially in the latter.

The next feature which merits attention is the relatively insignificant rôle of a tuberculous family history as an etiologic factor in pulmonary tuberculosis, when contrasted with the importance of the lessened resistance resulting from a preexisting disease. A prominent feature, and one which militates against the best results at this hospital, is the limited period that patients remain under treatment, the average being but four and one-tenth months, and in such a markedly chronic disease this must be considered in the interpretation of the statistics. Many were discharged at their own request, convalescent and improved, who, after their discharge from the service, were unwilling to submit longer to the necessarily rigid rules and regulations of the hospital. Many also were unable to resist the pangs of nostalgia, due largely to the isolated location of the hospital and the aridity of the vicinity.

In 51 per cent of the cases there had been a history of pulmonary hemorrhages. When this is contrasted with the fact that they have occurred in but 15 cases at this hospital, it is evident that the prevalent opinion that residence in a high altitude is contraindicated in such cases has no foundation in fact. In 78 per cent of the cases the disease was contracted in the Tropics.

Reinfections, diarrheas, night sweats, and intercurrent diseases, owing to the hygienic environment, play an unimportant part in the course of the disease as manifested in this hospital. In 90 per cent of the cases there was evidence of the pulmonary affection in the conformation of the chest.

In five cases the diagnosis of pulmonary tuberculosis was not confirmed, as follows: In three the physical signs gave evidence of "healed tuberculosis," and the tuberculin test was negatived on admission. One patient had septic bronchitis and died of acute peritonitis of unknown origin, and the fifth had tuberculosis of the chest walls and pleura, without involvement of the lungs. In this case the tuberculin test was also negative on admission, and death resulted from rupture of an aortic aneurism. Of the remaining 153 patients who were discharged or died, 16 were under treatment less than one month, and are not, therefore, considered in this report of results, leaving 137 patients, of whom 24, or 17 per cent, died; 42, or 30 per cent, were unimproved; 33, or 23 per cent, were improved; 22, or 16 per cent, were convalescent; and 16, or 11 per cent, were clinically cured.

Patients are classed as convalescent when no tubercle bacilli are found after repeated examination, and, though active symptoms have almost disappeared, they still react to the tuberculin test. Those who, after all symptoms have disappeared, fail to react to the tuberculin test are recorded as clinically cured.

Of the 137 patients who died or were discharged, 30, or 22 per cent, exhibited permanent afebrility, and when admitted had no tubercle bacilli in their sputum (class 1). In these the following facts were elicited on admission: Family history was negative in 23 and positive in 7. In 9 the pulmonary tuberculosis was complicated by other diseases of the lungs or pleura, viz, emphysema, fibrosis, chronic bronchitis, and pleuritis with effusion. In 1 there was tuberculosis of the peritoneum in addition to the pulmonary lesion. Secondary anemia was present in 14; hyperleukocytosis in 3. In none did the blood show degeneration of red cells or myelocytes. In all the presence of adventitious organisms in the sputum was a marked feature. These organisms, named in order of frequency of their occurrence, though several varieties are commonly found in one specimen, are: Staphylococci, streptococci, Micrococcus pneumoniae crouposae, Friedlander's bacillus, Micrococcus tetragenus, Leptothrix buccalis, and sarcinae. In 20 cases, or 66 per cent, the tuberculosis was secondary to a preexisting disease: Malaria ranked first, being a factor in 10; pneumonia next, in 7; dysentery in 2, and pleurisy in 1. In 22 patients, or 73 per cent, the pulmonary disease was evidenced by the conformation of the chest, viz, retraction of tissues over apices, drooping of one shoulder, narrowing of intercostal spaces, and rigidity of ribs; only 4 of this class presented tuberculous facies when admitted. In 22 the lesion was infiltration, and in the remainder infiltration plus consolidation. The diazo-reaction was absent in all. In 16 there was a history of pulmonary hemorrhage. In 22 the tuberculin test confirmed the diagnosis; in 2 cases, at first negative, tubercle bacilli subsequently appeared.

In contrast to the above data, which illustrate the condition on admission, the following facts were noted at the time of discharge: Twelve, or 40 per cent, of these 30 patients were clinically cured; 13, or 43 per cent, convalescent; and 5, or 16 per cent, unimproved. In 10 there were complicating pulmonary affections; this is 1 more than on admission, 1 patient developing emphysema while under observation. Anemia was present in 4, which is 10 less than on admission. Hyperleukocytosis was present in 2. In 1 patient tubercle bacilli did not appear in the sputum until 5 months after admission. Adventitious organisms were present in the sputa in 12, which includes all who had any expectoration on discharge. None had tuberculous facies at the time of discharge, but 18 presented evidence of disease in conformation of chest, which is 4 less than on admission; 12 presented the physical signs of a lesion, best described by the term "healed tuberculosis;" 17 still presented the physical signs of infiltration, and 1, which is 6 less than on admission, had infiltration plus consolidation. Only 1 of this class had a hemorrhage while under observation, notwithstanding that over 50 per cent presented a history of hemorrhage. In 9 of the 12 discharged as clinically cured, the tuberculin test was negative. The other 3 objected to the tuberculin test, but were entirely without symptoms of active disease, and it was therefore considered unnecessary to insist upon its administration. Four of this class had a relapse, in 3 tubercle bacilli were present for a short time, and they were found in but 1 at the time of discharge. The diazo reaction was still absent in all.

Conclusions in regard to afebrile patients without tubercle bacilli (class 1).—This class presents a pure type of tuberculosis without mixed infection. Slight secondary anemia is often present, but is never marked or constant. Degenerated red corpuscles are never present, abnormal leukocytes are very rare, and when found are apparently accidental and ephemeral, and the same is true of hyperleukocytosis. Adventitious organisms in the sputum are a permanent feature while expectoration continues, and they therefore bear no relation to the presence or absence of mixed infection, as there is no mixed infection in this class.

The typical lesion is a slight infiltration of one apex, with or without signs of activity, though some consolidation is occasionally encountered. Increased density, occasionally associated with moisture over the affected area, even after the patients have passed the tuberculin test and are clinically cured, is uniformly present. A history of previous hemorrhage occurs in this class as often as in others, but a hemorrhagic tendency is not exhibited. The prognosis in this class is very good, as evidenced by 12 clinical cures and 13 discharged convalescent before complete arrest of the disease could be reasonably expected. In this class the diazo-reaction is never observed. The average daily maximum temperature is 98.9° F., which is evidence that pure uncomplicated tuberculosis is an afebrile affection.

In the 2 cases where the tuberculin test was negative on admission, tubercle bacilli subsequently appeared, possibly as the result of reinfection in a susceptible subject. In one case this is the most probable explanation, for the tubercle bacilli did not appear until five months after the test; this patient was the only one of this class discharged with tubercle bacilli in the sputum. In the other it is hardly so applicable, for the tubercle bacilli were found within a week after passing the test and apparently as a result of the action of the tuberculin; however, within a few weeks the bacilli disappeared, the patient again passed the test, and was finally discharged clinically cured. In this case also the tuberculin test failed to demonstrate the existence of tuberculosis. In one patient in whom there was complicating fibrosis and arteriosclerosis the tuberculin reaction had an unfavorable influence upon the subsequent course of the disease, though in this case tubercle bacilli were never found, and the patient was discharged unimproved. In still another case a negative result of the tuberculin test was followed by an evening temperature slightly above 99° F. for several weeks, though it subsequently fell to normal.

Of the second class, afebrile cases with tubercle bacilli, 59 patients were discharged. In these the general course of the disease was afebrile, and when fever occasionally occurred it was always amenable to rest treatment.

The following facts were elicited from them on admission: In 45 the family history was negative, in 1 unknown, and positive in the remaining 13. In 4 there were complicating affections of the lungs. In 3 there was chronic laryngitis. In 10 there were other complications, including malaria, cerebral syphilis, chronic nephritis, hernia, anal fistula, dementia, otitis media, and hemiplegia. There was tuberculosis of other organs in 8, as follows: Testicles 2, peritoneum 1, larynx 2, inguinal glands 1, and intestinal tuberculosis 2. In 42 there was secondary anæmia. In 35 there was hyperleucocytosis. In 9 there was degeneration of red cells, and myelocytes were present in 5. Adventitious organisms were present in the sputum of 12. The pulmonary tuberculosis was preceded by some other disease in 40, or 68 per cent. As in the previous class, malaria led, being the inciting cause in 23, malaria and dysentery together in 4, chronic diarrhea in 3, influenza in 2, catarrhal jaundice in 1, perineal abscess in 1, tuberculosis of cervical glands in 1, and pneumonia in 5. Tuberculous facies was present in 15. In 52 there was evidence of the pulmonary disease in the conformation of the chest. In 30 there was a history of hemorrhage. The diazo-reaction was present in 3. The lesion in 24 was infiltration alone; in 25 there was infiltration plus consolidation, and in the 9 remaining there was infiltration, consolidation, and cavities.

Their condition on discharge was as follows: None of these patients died; 18, or 29 per cent, were unimproved; 28, or 48 per cent, were improved; 9, or 16 per cent, were convalescent, and 4, or 6 per cent, were clinically cured. None of this class ever became permanently febrile. In 20 there was secondary anæmia, or 15 less than on admission. Hyperleucocytosis was present in 22, or 15 less than on admission. Neither degeneration of red cells nor myelocytes were present in any. Tubercle bacilli were absent from the sputum in 10. In 4 there was no expectoration. Adventitious organisms were present in 13, and were mostly confined to those patients in whom tubercle bacilli had disappeared. Tuberculous facies was present in 13. Evidence of disease in conformation of chest persisted in 45, or 7 less than on admission. At the time of discharge the lesion in 4 was "healed infiltration," infiltration alone in 30, consolidation plus infiltration in 17, and cavities still persisted in 8. There was therefore a marked improvement in the character of the lesion in this class, particularly in the resolution of consolidated areas. The least change occurred in the cavity cases, and they of course present the most unfavorable type. In 6, hemorrhages occurred while under observation. The tuberculin test was negative in 2 at the time of discharge; the other 2 discharged clinically cured objected to the tuberculin test, and it was not considered necessary to insist upon its administration. The diazo-reaction persisted in but 1 case, although this patient improved. There was no relapse in this class. The average maximum daily temperature was 99.5° F.

Conclusions in regard to afebrile patients with tubercle bacilli.—This class presents either a pure type of pulmonary tuberculosis or minor degrees of mixed infection. The latter is readily and accurately estimated by the degree of hyperleucocytosis, which, as has been seen, was present in the majority of these cases on admission. That mixed infection in a minor degree, as in this class, is amenable to treatment is illustrated by the smaller number presenting hyperleucocytosis at the time of discharge and by the following results: Four clinically cured, 9 convalescent, and 28 improved, out of a total of 59. This is preeminently the type of the disease in which time is required to effect cure or arrest, and in which it is so difficult to impress the fact upon the patients, owing to the absence of pain or other distressing symptoms. The influence of other tuberculous lesions was apparently slight, even in the few cases where such complications occurred. Of 7 that presented tuberculosis of other organs only 3 were discharged unimproved; in one case with laryngeal ulceration, and in another with genitourinary involvement, the improvement was remarkable.

Secondary anemia, a marked feature of these cases, disappeared in 50 per cent of those who exhibited it on admission. Adventitious organisms in the sputum were confined mostly to the most favorable cases, and became a constant feature when the tubercle bacilli disappeared.

The tendency of this type is toward recovery, as evidenced by the fact that none died, and but 17 out of 59 were discharged unimproved. The diazo-reaction occurs rarely, and only in the least favorable cases.

Of the third class, cases exhibiting permanent febrility with tubercle bacilli, 48 were discharged or died. In them the facts elicited on admission were as follows: The family history was negative in 35 and positive in the remaining 13. In 6 there were complicating diseases other than tuberculosis. In 12 there was tuberculous involvement of other organs, of the larynx in 9. Secondary anæmia was present in all; hyperleucocytosis in all; degeneration of red cells in 15; myelocytes in 6, and adventitious organisms in the sputum of 14. In 28 the tuberculosis followed some other disease. Again malaria led, being a solitary factor in 10 cases, malaria with dysentery or chronic diarrhea in 3, dysentery in 4, pleuritis in 3, pneumonia in 2, typhoid fever in 2, chronic diarrhea in 2, measles in 1, and appendicitis in 1. All of these cases presented tuberculous facies, and all gave evidence of the disease in the conformation of the chest. There was a history of pulmonary hemorrhage in 20. The diazo-reaction was present in 23.

Of the 48 in this class, 24, or 50 per cent, died; 20, or 42 per cent, were discharged unimproved, and 4, or 8 per cent, improved in general condition. None was cured or discharged convalescent, and 13 had tuberculosis of other organs, 1 more than on admission. This patient developed intestinal tuberculosis while under observation. None ever became afebrile. All those discharged presented anæmia and hyperleucocytosis, 19 had degeneration of red cells, and in 6 there were myelocytes. In 1 tubercle baccilli were absent from the sputum, but were found in pus withdrawn from the pleural cavity. Adventitious organisms were still present in 10. In 4, all of whom died, hemorrhages occurred while the patients were under observation. The diazo-reaction was present before death or discharge in 30. Consolidation, infiltration, and cavity or cavities were present in 38 cases; 9 had consolidation and infiltration, and but 1 infiltration alone. The average maximum daily temperature in this class was 101.5° F., which is much lower than is commonly observed among similar cases in lower altitudes.

Conclusions.—The family history does not assume a more important place in this than in other types of the disease. Tuberculosis of other organs is more frequently present, particularly laryngeal tuberculosis, and though the latter is not directly a cause of death it contributes to the fatal termination. Hyperleucocytosis and more or less severe anæmia are constant features. As might be foreseen, degeneration of red cells as a manifestation of advanced secondary anæmia is present more frequently than in any other class, but its absence can not be interpreted as indicating a favorable prognosis. This is likewise true of the presence of myelocytes in the blood and the diazo-reaction in the urine. Another fact readily anticipated from the nature of the cases in this class is the constant evidence of disease in the conformation of the chest and the tuberculous facies.

Adventitious organisms in the sputum, if they bear any relation to mixed infection, would certainly be a feature of this class, which is undoubtedly one of mixed infection, and yet they were absent in the large majority of cases, and when present were apparently accidental and without relation to the type. With a death record of 50 per cent and a hopeless prognosis in the remainder, the futility of climatic treatment for this class is unquestionable.

Of the 125 patients remaining under treatment December 31, 1900, in 2 the diagnosis was not confirmed, as the tuberculin test was negative on admission, and they were apparently cases of "healed tuberculosis." Twenty-three had beenu nder treatment less than one month, leaving 100 cases for consideration, with results as follows: Twenty-six unimproved, 48 improved, and 26 convalescent.

Of the first class, afebrile cases without tubercle bacilli, there were 23 patients. In these the following facts were elicited on admission: In 20 the family history was negative and positive in 3. Complicating pulmonary affections existed in 7, and other complicating diseases in 4. There was tuberculosis of other organs (inguinal glands) in but 1; 13 presented varying degrees of secondary anæmia; there was hyperleucocytosis in 3. Degeneration of red cells or myelocytes were not observed in this class. Adventitious organisms were present in the sputa of 19, the other 4 having no expectoration. In 18, or 78 per cent, the tuberculosis was preceded by another disease, malaria in 7, dysentery in 5, pleuritis in 2, pneumonia in 1, yellow fever in 1, chronic diarrhea in 1, and inflammatory rheumatism in 1. Tuberculous facies was absent in all. In 17 there was evidence of the disease in the conformation of the chest. The lesion was infiltration alone in 21; in 2 infiltration plus consolidation. In 7 there was a history of pulmonary hemorrhage. The tuberculin test was positive in 22; the one case in which it was negative on admission gave a characteristic reaction later. The diazo-reaction was absent in all.

Conditions December 31, 1900: Four, or 17 per cent, were unimproved; 19, or 83 per cent, were convalescent; complicating pulmonary affections persisted in 6. The tuberculous inguinal glands had been removed by operation. Anæmia persisted in 6, 7 less than on admission; hyperleucocytosis in 2, 1 less than on admission. Tubercle bacilli appeared in 6 and were still present in 3 of these. In 6 expectoration had ceased. In 13 adventitious organisms persisted. The lesion remained unchanged in all but 2, in which consolidation heralded the appearance of tubercle bacilli in the sputum. In no case had a hemorrhage occurred since the patients were under observation.

Of the second class, afebrile patients with tubercle bacilli, there were 63 under treatment. The following facts were elicited on admission: The family history was negative in 49 and positive in 14. In 4 there were complicating pulmonary diseases; in 21 there were other complications. In 5 there were tuberculous lesions of other organs—the intestines, tonsils, lower jaw, testicle, and larynx. Secondary anæmia was present in 40, hyperleucocytosis in 39, degeneration of red cells in 3, and myelocytes in 1. Adventitious organisms were present in 19. In 41, or 83 per cent, the tuberculosis followed some other disease—malaria in 24, dysentery in 5, chronic diarrhea in 3, pneumonia in 2, pleuritis in 2, chronic bronchitis in 1, influenza in 2, typhoid fever in 1, and syphilis in 1; 24 patients presented tuberculous facies. In 60 there was evidence of the disease in the conformation of the chest. The lesion in 31 was infiltration, in 27 there was infiltration plus consolidation, and in the remaining 5 cavities were present. Thirty-six presented a history of hemorrhage. The diazo-reaction was present in 5.

Their condition December 31, 1900, was as follows: Thirteen, or 20 per cent, unimproved; 44, or 69 per cent, improved, and 6, or 9 per cent, convalescent. Complicating diseases of the lungs persisted in 4. In 13, 8 less than on admission, other complications remained. In 4, 1 less than on admission, there were still other tuberculous complications, the lesion of the lower jaw having completely healed. Twenty-five, 15 less than on admission, were anæmic, and 31, 8 less, had hyperleucocytosis. Two had degeneration of red cells and myelocytes. In 6 the tubercle bacilli had disappeared from the sputum. In 19 there were adventitious organisms in the sputum. Nineteen, 6 less than on admission, had tuberculous facies. Nearly all gave evidence of the disease in the conformation of the chest. In 28 there was infiltration alone, in 26 infiltration plus consolidation, and in the remaining 9 cavities, practically the same as on admission. Four had pulmonary hemorrhage while under observation. Six presented the diazo-reaction, 1 more than on admission. One patient relapsed after having become convalescent.

Of the third class, presenting permanent febrility and tubercle bacilli, 14 remained under treatment December 31, 1900. The following facts were elicited on admission: The family history was negative in 12 and positive in 2. Five presented complications other than tuberculosis. There was tuberculosis of the larynx in 2, and in 1 there was tuberculous pyopneumothorax. Anæmia and hyperleucocytosis were present in all, degeneration of red cells in 2, myelocytes in 1, and adventitious organisms in but 5. In 9, or 64 per cent, there was a history of preceding disease—malaria in 7, pneumonia in 1, and pleuritis in 1. Tuberculous facies was present in all but 1, and evidence of the disease in the conformation of the chest in all. In 6 the lesion was consolidation and cavity; in the remainder consolidation plus infiltration. In 8 there was a history of pulmonary hemorrhage. The diazo-reaction was present in 6.

Their condition December 31, 1900, was as follows: Nine, or 64 per cent, were unimproved; 4, or 28 per cent, improved in general condition, and 1 convalescent. Three presented other complications, 2 less than on admission, in which malaria and dysentery had disappeared. Three still presented complicating tuberculosis, 1 became afebrile, 10 continued anæmic—4 less than on admission; 11, or 3 less, had hyperleukocytosis, 1 had degeneration of the red cells, and 1 presented myelocytes. Tubercle bacilli had disappeared from the sputum in 1, adventitious organisms were present in all but 2, 12 had tuberculous facies, and the entire number had evidence of the disease in the conformation of the chest. In each one the lesion was the same as on admission. Two had pulmonary hemorrhage while under observation, and 7 had the diazo-reaction.

In general, it may be said that the prognosis of these patients is a trifle better than for those of the same type discharged, owing to a process of selection, only the most favorable remaining; but even in these there is little prospect of ultimate cure.

The case of the patient who became convalescent and in whom the tubercle bacilli disappeared is worthy of note. Here there was pyopneumothorax of the left chest. For months the patient was bedridden, expectorating from one-half to 1 liter of offensive pus daily. At one time his weight was reduced to 89 pounds, the evening temperature was constantly from 101 to 103° F., but his appetite, though capricious, remained. Expectoration suddenly ceased almost entirely, the patient improved and now weighs 136 pounds, and except for a badly injured left lung is practically well.

The combined results of 236 patients, who had been under treatment for one month or over, are as follows: Twenty-four, or 10 per cent, died; 68, or 28 per cent, are unimproved; 80, or 33 per cent, are improved; 48, or 20 per cent, are convalescent, and 16, or 6 per cent, are clinically cured.

The report from this hospital for the fiscal year ended June 30, 1901, is as follows:

Remaining July 1, 1900.

Regular Army:		
Officers	3	
Enlisted men (of whom 26 remained as beneficiaries of the Soldiers' Home after discharge from service)	37	
Female nurses	1	
		41
Beneficiaries of the Soldiers' Home		38
Total		79

Admitted during the year.

Regular Army:		
Officers (including 1 retired)	3	
Contract surgeons	1	
Enlisted men (of whom 107 remained as beneficiaries of the Soldiers' Home after discharge from service)	188	
Female nurses	1	
Retired enlisted men	1	
Civilians	5	
		199
Volunteers:		
Officers (Porto Rico Battalion)	1	
Enlisted men (of whom 4 remained temporarily after discharge from service)	37	
		38
Beneficiaries of the Soldiers' Home (133 enlisted men remained as beneficiaries of the Soldiers' Home after discharge from the service, and 1 remained after being retired)		28
Total		344

During the year 184 patients were discharged, as follows:

Regular Army:		
Officers	1	
Enlisted men discharged from service	17	
Enlisted men returned to duty	5	
Enlisted men retired	2	
Female nurses	2	
Civilians	4	
		31
Volunteers:		
Enlisted men discharged from the service (of whom 4 remained temporarily after discharge)		33
Beneficiaries of the Soldiers' Home		120
Total		184

Died during the year.

Enlisted men of Regular Army	15	
Enlisted men of Volunteers	4	
Beneficiaries of the Soldiers' Home	21	
		40

Remaining June 30, 1901.

Regular Army:			
Officers (including 1 of Porto Rico regiment)	6		
Contract surgeons	1		
Enlisted men	54		
Civilians	1		
		62	
Beneficiaries of the Soldiers' Home		58	
			120
Total			344

Of those who died, 10 were under treatment less than one month, as follows:

Enlisted men of the Regular Army	6
Enlisted men of Volunteers	3
Beneficiaries of the Soldiers' Home	1
Total	10

Of the 184 patients discharged, 17 were under treatment less than one month. The remaining 167 were under treatment an average of 5.4 months, and their condition on discharge was as follows:

Clinically cured	10
Convalescent	26
Improved	73
Not improved	58
Total	167

During the year an antiphthisic serum, by a St. Louis, Mo., firm, was tried in 33 cases, the patients willingly submitting to the treatment. Contract Surgeon E. S. Bullock conducted the experiments, and reported his results, as follows:

With two exceptions (in which the serum was used on the urgent request of the patients) the cases treated were selected from the more favorable cases, and all were febrile. In 10 cases the treatment was discontinued within a few days, the patients being discharged or objecting to its continuance.

The serum was administered daily in initial doses of 0.005 and increased at the rate of 0.005 per week to 0.015, which dose was continued during the remainder of the treatment.

In a majority of the cases a disagreeable reaction resulted in five or six days, consisting of a rise of temperature, malaise, headache, and cutaneous irritation (either urticarial or erythematous). In four cases there was an extremely distressing, though ephemeral, instantaneous reaction, in which there was an intense fullness in the head, flushing of the face, pain in the lumbar region, and marked dyspnea, in all probability due to the introduction of the serum directly into the circulation.

In six cases the treatment was discontinued after an average of 18 days on account of a permanent rise of temperature, which subsided shortly after its discontinuance.

In five cases there was no apparent change in the condition of the patient during the treatment, which was continued 45 days in two; 63, 89, and 170 days, respectively, in the others—an average of 82 days.

In six cases the condition of the patient was aggravated during the treatment. In these it was continued 36, 46, 62, 71, 77, and 134 days, respectively—an average of 71 days.

In six cases the patients improved both before and during the treatment, which was continued 170 days in three; 31, 51, and 70 days, respectively, in the others—an average of 110 days. The favorable results in these six cases were no better than in many similar cases under treatment in this hospital without the use of serum.

The following report from the attending surgeon United States Soldiers' Home, Washington, D. C., shows the provision made for the care and comfort of the inmates of that institution when sick:

REPORT ON THE BARNES HOSPITAL, UNITED STATES SOLDIERS' HOME, WASHINGTON, D. C., JANUARY 30, 1901, BY MAJ. L. A. LA GARDE, SURGEON, UNITED STATES ARMY.

A description of the hospital devoted to the care of the sick among the inmates of the Soldiers' Home, the institution which forms a retreat for disabled discharged soldiers of our Regular Army, would seem appropriate at a time when the Army, as recently enlarged, is furnishing it with more patients than ever before.

The care of the discharged army invalid, the erstwhile recruit, seasoned soldier, and finally, the faithful old warrior who willingly sacrificed the best years of his life to his country's military service, is ever a matter of public interest, and it becomes especially so to the Army and its medical department. The average number of inmates in the Home for each of the years 1897, 1898, 1899, 1900, was, respectively, as follows: 722, 751, 807, 838. The figures show a marked increase in the last two years as a result of a larger army and casualties incident to recent campaigns in war.

Number of inmates in the United States Soldiers' Home June 30, 1901, with their length of active service.

Service.	Number.
5 months	1
6 months	4
7 months	2
8 months	3
9 months	4
10 months	2
1 year	23
2 years	47
3 years	64
4 years	14
5 years	38
6 years	16
7 years	12
8 years	21
9 years	20
10 years	15
11 years	20
12 years	22
13 years	24
14 years	10
15 years	21
16 years	20
17 years	14
18 years	26
19 years	29
20 years	101
21 years	71
22 years	47
23 years	38
24 years	30
25 years	25
26 years	23
27 years	9
28 years	6
29 years	2
31 years	2
Total	826

Age of inmates.

Years.	Number.
21 years	1
22 years	2
23 years	1
24 years	2
25 years	5
26 years	3
27 years	5
28 years	5
29 years	10
30 years	12
31 years	5
32 years	5
33 years	6
34 years	6
35 years	13
36 years	8
37 years	4
38 years	2
39 years	5
40 years	7
41 years	2
42 years	7
43 years	8
44 years	3
45 years	12
46 years	19
47 years	9
48 years	19
49 years	14
50 years	13
51 years	11
52 years	33
53 years	40
54 years	44
55 years	41
56 years	32
57 years	40
58 years	28
59 years	31
60 years	17
61 years	33
62 years	18
63 years	30
64 years	20
65 years	29
66 years	22
67 years	14
68 years	17
69 years	13
70 years	10
71 years	18
72 years	9
73 years	11
74 years	6
75 years	10
76 years	8
77 years	5
78 years	10
79 years	2
80 years	3
81 years	4
83 years	1
85 years	1
88 years	1
94 years	1
Total	826

BARNES HOSPITAL, FRONT VIEW.

Nativity of inmates.

Born in—	Number.	Born in—	Number.
nited States	339	Denmark	8
reland	218	Norway	5
Germany	156	France	10
England	36	Russia	3
cotland	9	Belgium	3
Austria	8	Roumania	1
Canada	12	East India	1
Sweden	9		
Switzerland	8	Total	826

The Barnes Hospital, devoted to the care of the sick of the Home, may be thus described:

The hospital, first occupied in 1876, is built of brick and consists of a central administration building, measuring 52 by 55 feet, two pavilion wings, each 64 by 29 feet, having two end towers, and an annex. The central building has a basement, hree stories, and a mansard roof, while the rest of the structure, including the annex, has two stories, with basement and mansard. Many changes have been made in the hospital since it was first occupied. These changes have reference to heating and ventilation, lighting, new furniture, elevator service, introduction of cold storage in place of ice, the use of steam in lieu of coal and gas, alteration in kitchen, etc. The annex, which constitutes the principal addition, was occupied in April, 1899, thereby ncreasing the capacity of the hospital from 82 to 112 beds.

Heating and ventilation.—The hospital is now heated by hot water, with direct ndirect radiation, instead of the inverted-siphon system, with provision for heating nlet air from chambers heated by hot-water pipes. The latter, including the boilers pertaining to the heating system, needed renewal after long usage, so that the simpler method referred to was adopted. The exit air from the wards is carried by ducts in the ceiling to a central shaft, which receives heat from the smokestacks of the heating apparatus.

Lighting.—Lighting by gas was supplanted by electric lighting in 1898. The power is owned by the Home. New white-enameled combination pendants were put in place of the old gas chandeliers in 1899.

New furniture.—The old-style iron bunks and wooden tables for the wards have been replaced by modern white-enameled beds and glass-top tables. Rolling chairs have been added to the wards and for use in the grounds; the men's boxes, formerly painted a yellow color, were painted with white enamel.

Elevator service.—In a hospital having so many cripples and long-lived invalids the effort to ascend and descend stairways is always irksome. This was especially true of the Barnes Hospital, in which the sole opportunity to relieve the daily routine of ward life lay in an airing on the porch. The construction of the annex afforded a central location—at the junction of the two buildings—for an elevator, which is run by hydraulic pressure. Many invalids who seldom left the building are now free to go about the grounds, and to go to their meals three times a day, when formerly their food had to be carried to them—a practice which, aside from many other objections, was very laborious to the ward nurses.

Cold storage.—The value of cold storage in institutions used as habitations in recent years has been so thoroughly demonstrated on sanitary and economic grounds that the opportunity to embrace this modern convenience was very wisely decided upon in the construction of the annex. The machine in use is the Remington, which enables us to make 200 pounds of ice per day, and supplies in addition cold storage to two boxes for food stuffs in the commissary and culinary departments and one box for the reception of cadavers in hot weather.

Steam.—Upon the construction of the annex in 1899 the proximity of the pump house to the hospital rendered the introduction of steam feasible for a number of uses. (1) Formerly the bath water for all the bathrooms was heated by three distinct fires in the basement. This practice entailed a good deal of labor aside from being a source of much nuisance. Water for bathing purposes in all the rooms and for use in kitchen and dining room is now heated by a steam coil in a large boiler centrally located in the basement. (2) The introduction of steam, as stated, enables us to operate the cold storage at a fractional cost, and it furnishes heat for the bain-marie and plate warmer in the kitchen and the sterilizers in the operating room.

Alteration of kitchen.—With other recent changes the partition in the kitchen which divided it from the pantry was torn down, converting the two rooms into one large room. The old wooden floor was taken up and a new terrazo floor put in its place to correspond to that in the dining room. The cooking range, which was small before, was increased by another oven, and this addition to the cooking area necessitated a larger hood to carry off the heat and vapors. The kitchen has been further provided with a bain-marie, plate warmer, and an overhead rack on which to hang cooking utensils, tea and coffee urns, etc.

The annex.—The annex is composed of three stories and basement. The basement is divided through its length and width by halls, and it is further divided into rooms for supplies, heating apparatus, cold storage, and machinery for elevator. The first floor is divided in its length by a well-lighted hall, 5 feet by 54 feet, which connects with 8 commodious rooms, 5 of which are used as surgical wards, each containing 2 beds, while the other 3 are devoted to the use of the nurses and the storage of linen. At the northern exposure of the building are located the water-closet and bath, the etherizing, operating, and sterilizing rooms, also the laboratory for clinical microscopy and X-ray apparatus. The second floor contains a medical ward, 30 by 54 by 14 feet, with 14 beds; 2 isolation wards, one 16 by 20 feet and the other 16 by 18 feet, 3 beds to each; ward master and nurses' rooms, a special diet kitchen, linen room, and bath and water-closet. Before the construction of the annex the dining room was located on the second floor of the administration building, under the kitchen. The room was small, seating but one-third of the men at a time, so that it was necessary to set the table three times for each meal. The construction of the annex gave the opportunity to put the dining room on the same level with the kitchen. All of the space which corresponds to the ward below was devoted to this purpose. There is now a spacious dining hall, 54 by 29 feet, with a seating capacity of 104, which can be increased to 130, when needed, without crowding. The rest of the space at the end of the building is devoted to bathroom and water-closet for use of the dining room and kitchen help, a pantry, a china closet, sleeping rooms for the dining-room men, etc.

The advances in the field of diagnosis in recent years have rendered thoroughly equipped laboratories for research into the causes of disease an indispensable feature of all general hospitals. With this idea in view it was determined to place the Barnes Hospital on a footing with the leading hospitals of this country. Under the active supervision of Dr. A. B. Herrick, the clinical assistant, we now have a well-appointed laboratory for clinical microscopy, supplemented by a Röntgen-ray apparatus and photographic department.

The pathological and anatomical material is worked up and recorded. Analyses are made of the urine, sputum, gastric juice, and stools, which are most valuable for diagnostic purposes; also bacteriological cultures are taken when necessary, as a further aid to diagnosis. The Edison break-wheel X-ray machine formerly in use is about to be replaced by a static machine more suited to a fixed hospital. Bullets have been located, fractures reduced and placed in apposition under the direct light of the X-ray; also, later, they are examined, by means of the ray, directly through dressings.

Operating room.—The operating room occupies the space at the north end of the annex. It is a spacious, well-lighted room, with two anterooms in which to etherize patients and to conduct the sterilizing of instruments, dressings, etc. The furniture and fixings were supplied by the Kny-Scheerer Company, of New York, and the appointments generally are of the best.

The medical ward has 14 beds and two isolation rooms of 3 beds each, with a ward master and 4 nurses. The surgical ward, of 10 beds, has a ward master and 3 nurses. The two upper convalescent wards (C and F) have each 16 beds and two small rooms of 1 bed each. A ward master is in charge of each ward. E ward, comprising seven small rooms, has a nurse in charge. B ward, of 12 beds, on the second floor, is used for old, chronic cases, most of whom are unable to go to their meals, and is in charge of a ward master and 2 nurses. A and D wards, on first floor, of 13 beds each, with ward master and 1 nurse to each, are for chronic cases and men on wheeled chairs who can go to their meals by the elevator.

The kitchen, on the third floor, has a chief and second cook, and 3 men as dishwashers, preparing vegetables, etc. It is supplied with a modern range of sufficient capacity for over 150 men, and all modern conveniences. The dining room is also on the third floor, connected with the kitchen by a corridor, and food is brought direct to the tables on a large wheeled car, which later is used to take the dishes, etc., to the pantry to be washed. It is in charge of a chief and 5 assistants.

The duties of the steward are to superintend the entire hospital, under the orders of the surgeon in charge. He has charge of all the property and all the employees, and keeps the hospital in order; is responsible for the care of instruments, medical supplies, books, and everything in the hospital. He also keeps the records, with such clerical assistance as may be necessary. He has under him a druggist to dispense the medicines and a commissary-sergeant to attend to the rations and laundry work, a chief cook, chief of dining room, chief of nurses, firemen, laborers, etc. He consults daily with the surgeon in charge with regard to all matters of hospital administration, and receives his instructions.

The following list is given to show the cause of mortality among men who have engaged in the military service. Like all mortuary statistics, in former times these have been imperfectly kept, and therefore no reliable deductions can be made from them. The list is here given for what it is worth. Reference to the present method of observing the causes of death will be made later.

From January, 1876 to June 30, 1901 (25½ years), there were 914 deaths, as follows:

Disease.	Number.	Disease.	Number.
Abscess:		Fever:	
Brain	2	Malarial	2
Pancreas	1	Typhoid	1
Psoas	2	Frozen to death	3
Alcoholism	10	Gangrene:	
Aneurism, aorta	34	Pulmonary	5
Apnea	1	Senile	5
Apoplexy	29	Gastritis	15
Arthritis, chronic	1	General debility	3
Asthenia	1	Hepatitis	8
Asthma	1	Hematemesis	3
Bright's disease	38	Hemiplegia	2
Bronchitis	10	Hemophilia	1
Cancer:		Hernia, femoral, strangulated	1
Axilla	1	Hip joint, disease of	2
Bowels	4	Lateral sclerosis	1
Bladder	1	Leukemia	1
Epithelial	9	Lockjaw	1
Gall bladder	1	Locomotor ataxia	4
Larynx	1	Meningitis	9
Liver	6	Nerve disease, exhaustion from	2
Mesentery	5	Obstruction of bowels	2
Parotid	1	Old age	55
Prostate	1	Paralysis:	
Rectum	1	General	17
Stomach	18	Of heart	7
Cerebral hemorrhage	12	Paraplegia	4
Cholera morbus	1	Pericarditis	4
Cirrhosis of liver	15	Peritonitis	8
Congestion of brain	24	Pleurisy	4
Consumption	220	Pneumonia	82
Cystitis, chronic	5	Pyemia	1
Diabetes mellitus	8	Rheumatism, chronic	3
Diarrhea, chronic	12	Rupture of heart	2
Disease of heart, mitral	10	Scalds	2
Disease of heart, valvular	74	Septicemia	1
Drowned	11	Stricture of rectum	1
Edema of glottis	1	Suicide	25
Embolism	9	Sunstroke	2
Empyema	1	Syphilis, tertiary	8
Enteritis	6	Tumor of brain	7
Epilepsy	2	Wounds:	
Erysipelas	2	Gunshot	1
Fatty degeneration of heart	4	Incised	1
Fractures:			
Hip	2		
Neck	1		
Skull	3		

Clinical report.—The cases treated at this hospital may be divided into two main groups: (a) Those affecting the old men, and being essentially the diseases due to degeneration of the various systems; (b) those affecting the young men, and being almost entirely either the remote effects of gunshot wounds or invalidism, etc., following tropical service. In the first group we find chronic affections of the lungs, rheumatism, the scleroses of the heart, arteries, and kidney, and various degenerations of the nervous system, especially tabes dorsalis. The second group is composed of, first, the various remote effects of gunshot wounds; second, neuritis, myelitis, debility, etc., following the various fevers; third, chronic dysentery. The main diseases affecting both groups are malarial fever, influenza, pleurisy, and pneumonia.

The cases of influenza occurring during the past year were of a very mild character, there being no fatal results from the disease. It was usually of a febrile and painful form, the mucous surfaces appearing only to suffer slightly. One case is worthy of mention from its close resemblance to typhoid fever, from which it differed by absence of Widal reaction and the typhoid rash.

Affections of the lungs are of very common occurrence, one of the most frequent complaints being a "stitch in the side." The attacks of pleurisy are of a very light character. The disease is usually a dry inflammation, running a short course of severe pain and fever, and clearing up in a few days. In a few cases it is of a more severe character and runs a prolonged course, with fever, night sweats, etc. The tubercle bacilli are found, often only after numerous careful examinations. Pneumonia generally occurs here among the aged, and rarely appears in the typical form. Usually the consolidation is not so complete and firm that the breath sounds have that characteristic tubular quality, but have rather a bronchial modification, with dullness and increased fremitus. The fever is usually low, often dropping to subnormal. Chronic bronchitis forms a large part of the lung cases. It is of a very obstinate form, usually obscure in its origin and very resistant to any treatment. One form is often associated with slight attacks of pleurisy. In this association inflammatory processes due to the tubercle bacillus are always carefully sought after, often with positive results. This, together with the very acute, almost pneumonic type, forms the usual methods of onset of tuberculosis seen at this hospital. The diagnosis of the latter disease is never positively affirmed without finding the bacilli in the sputum. In doubtful cases the tuberculin reaction is tried. In this connection the appearance of the lung when viewed by the X-ray is of interest. The difference between the normal lung and one but slightly infiltrated by the tubercular process is easily determined and best appreciated by direct view of the thorax with the fluoroscope. Cavities in the lung are very definitely revealed. The tuberculous cases are sent to the general hospital at Fort Bayard, N. Mex., as soon as the diagnosis is assured. But, besides these, there are every year a few cases which are admitted in the last stages, or in which the disease assumes such a malignant form that they have to be treated here, necessitating an isolated room devoted to the care of such cases only.

Arterial degenerations are seen mainly among the aged, but often cases occur where there appears to be a premature breakdown of the blood vascular system. All forms are seen, and the process not only involves the arteries themselves, but extends into their finer ramifications, thus appearing in the organs of the body, especially the kidneys. The arteries of the brain are frequently involved, as seen by the numerous hemiplegias continually present. Heart disease is very common, but is usually a mild sclerosis of the valves, without symptoms other than those of general arterial breakdown. True valvular disease is rarer than the above form, and is also far more amenable to treatment.

Rheumatism occurs in all its forms, and rheumatoid affections are frequent. The most common form seen is the muscular, next the articular, and then the syphilitic. The gonorrheal type is rare, only two cases appearing on the records of the past year. In the acute articular form we have aspirated the kneejoint in two cases for microorganisms with a negative result. Gout is relatively infrequent. Arthritis deformans is more common; a few cases are always present, showing the disease in all stages, from mild involvement to complete anchylosis. One case is of interest because of the extreme form manifested. The patient, a young man, after a sickness of a little over a year, was admitted to this hospital with an extensive involvement of the lower limbs by this disease. The knees and hips were dislocated and anchylosed. The ankles and tarsal joints were also involved, but to a less extent. The patient was bedridden. The pain on the slightest movement was excruciating. As the patient showed no improvement after three months of treatment, was rapidly becoming emaciated, and as there was no diminution in the associated pains, it was decided to amputate both legs at middle of thigh. This was done, with marked improvement in his general condition, the pains disappearing from the hip joints. He rapidly gained weight and was completely relieved from all troublesome symptoms, the disease passing into a quiescent stage. The differential diagnosis between articular rheumatism and arthritis deformans is one of the most interesting problems encountered here. In addition to the usual differential signs, we always examine the joints of the hands with the X-ray to determine any necrosis or abnormal process in the joint itself. This method has proved of value at times, the radiographs often showing an involvement of the joint by arthritis deformans when the clinical tests were not conclusive.

In the treatment of these affections during the past six months the method of baking the joint in a hot-air apparatus has been employed with most gratifying results. Arthritis deformans shows marked and rapid improvement. The pain is relieved and the movements of the joint increased to an extent not obtained by massage and medicines. Gonorrheal rheumatism also improves rapidly under this method. It is of value in the myalgic form, though here it is of very limited application, as the part affected is so often situated where it is impossible to thoroughly bake it. No case of simple articular rheumatism in the chronic stage was materially benefited by the method.

Diseases of the nervous system comprise another class of cases, of interest mainly rom the obscure problems in diagnosis which they present. Tabes dorsalis is the most common, and frequently shows unusual manifestations. Its onset as a rheumatoid affection is of course very common. In two cases the mode of onset was very rare. They were both admitted to the hospital for gastralgia, and a careful examination exhibited the fact that they were suffering from an attack of gastric crisis. In one of the cases the crisis occurs every four to eight weeks and lasts from two to ten days, the patient often sinking so low as to appear moribund. Another rare feature of the disease occurring in one case is the joint condition described by Charcot. In his case the arthropathy affects both knees and is of the hypertrophic form. Both oints are greatly enlarged, almost to twice their original size, the enlargement occurring in both bones entering into the articulation, but being more pronounced in the femur. Another case showed that the process had also involved the lateral columns of the cord, giving rise to the group of symptoms described by Gowers as ataxic paraplegia.

Paralysis agitans and the more moderate degenerations associated with old age are not infrequent. A few cases of insular sclerosis are met with. Myelitis and neuritis are seen among the younger men, as a sequence to various fevers. One case of special interest is that of a man who on admission, nine months ago, had the signs of a chronic myelitis, which, from the progress of the symptoms since admission, is becoming more and more disseminated and tending toward the classical signs of syringomyelia. More or less mental weakness and instability are seen in at least 5 per cent of the recent admissions to the Home, but it appears to be rather a hereditary taint than due to the tropical service, except in a very few cases where it is directly traceable to a sunstroke.

Among the men who have seen service in tropical countries a chronic form of dysentery is frequently seen. The stools are usually of a watery character, containing more or less mucus, but no blood. Intestinal indigestion and flatulence are invariably associated with it. The stools were carefully examined in all cases, but the cause of the disease was found in only three out of twenty-one cases. The amœba dysenteriæ was present in one case. After two months' treatment the organism disappeared, and the patient has had no signs of the disease for about nine months. In two cases the anguillula stercoralis, a form of the strongyloides intestinalis, was present. One of the cases was discharged as recovered after four months residence here, none of the parasites having been found during the last three months. In the other case the parasite is still present two months after admission, but in fewer numbers. The general condition of the patient shows very marked improvement. Cultures were made in nearly all cases, but with negative results. Shiga's bacillus was not obtained from a single case, nor did the bacillus give an agglutinative reaction with the patient's blood serum. In the bacteriological examination of the stools the method was pursued of isolating an organism from the stool which would agglutinate with the patient's serum, but in no case was it successful.

In surgery during the past year there have been 51 operations. Adenitis inguinalis, hemorrhoids, varicose veins, and hernia comprise the majority of the cases. There were 5 cases of hernia operated upon. In 3 cases the Bassini operation was performed, with a perfect recovery and no recurrence. In 2 cases the Halsted operation was performed, in one of which there was a recurrence at the outer point of the incision, but as the patient left the hospital without permission and went at hard work in three weeks, the blame rests with him rather than with the operation. A case of great interest was that of two simultaneous operations on a man 78 years old. The man was suffering with a cancer of the penis and a large right inguinal hernia. A typical Halsted hernia operation was performed; the penis was amputated at the scrotal junction. There has been no recurrence of the hernia and no metastasis from the cancer.

A case of interest on account of its rarity was a cancer of the right breast in a male. The tumor was first noticed seven months before admission, but had given no trouble except slight pain in that breast, shooting to axilla. At the time of admission the growth was about the size of a walnut, lying just above and outside the nipple and not attached to the skin. The nipple was not retracted but was not as freely movable as the left nipple. In the right axilla there were three small glands palpable, one the size of a large hazelnut. The lower part of the pectoralis major muscle and the axillary glands were removed. Patient made an uninterrupted recovery. Microscopical examination showed an adeno-carcinoma of the breast, with metastases to the axillary glands.

Medullary narcosis was employed in four cases, in three of which there was a contraindication to the use of ether or chloroform on account of the condition of the kidneys and lungs. Complete analgesia and partial anasthesia, extending up to the nipple line, were obtained in two cases. In these two, one a hernia and the other an excision of varicose veins, the operation was painless. In the third case, an excision of a tuberculous sinus from the perineum, only partial analgesia extending up to the umbilical zone was obtained, and there was a little pain experienced during the operation. In the fourth case, amputation of the right thigh, anesthesia and analgesia were obtained over the leg and back of thigh. After injecting a maximum dose of the cocaine solution into the spinal canal and no extension of the analgesia resulting, the method was given up and chloroform resorted to. Of the four cases three were successful. The fourth case was a failure, although the injection was made directly into the spinal canal, as was shown by the escape of spinal fluid through the needle.

Diseases of the ear.—The most common trouble with this organ has been due to accumulation of wax in the external auditory meatus, usually easy of removal by boric-acid syringing, but occasionally inspissated and requiring the use of an instrument. All such cases have been improved and where the drum was not injured have permanently recovered. Otitis media has occurred rarely, not more than 10 cases having presented themselves. None have required paracentesis. Inflation with the Pulitzer bag and postnasal douches have cured all the acute ones, and in several of the chronic character there has been permanent improvement. Eczema of the meatus has been seen three times, easily remedied by salicylic acid ointment. There was one case of polypus of tympanum, but the patient would not submit to an operation. Several cases of concussion leading to deafness of greater or less degree were not benefited by treatment.

Diseases of the nose.—Most of these cases were catarrhal and nearly all chronic. The acute case recovered; the chronic cases were all improved by local and systemic treatment. Nasal polypi were found in five cases, two of which were far advanced, and in both over 20 polypi of various sizes were removed by the cold snare method. In one of these there has been no return of the growth; the other case is still under treatment. Only one case of tuberculosis was seen. The focus was scraped and nitrate of silver applied with good effect. Unfortunately the man left the Home too early to judge the ultimate result. Syphilis has not occurred, except in so far as perforate septum is concerned. Two such cases were noted. Hypertrophic rhinitis is rather more common than the atrophic form. Hay fever is seldom seen, only one case appearing at the clinic. Deflections of the septum are not frequent, but three well-marked cases were seen, and all refused operation.

Diseases of the throat and larynx.—There have been about 10 cases of tonsillitis, usually of the follicular type. One case only developed peritonsilar abscess, and was lanced, with prompt recovery. One case of chronic syphilitic enlargement of the tonsils was seen. This patient was permanently relieved by antisyphilitic treatment. But 1 case of tumor of the larynx occurred. In this case there were 3 small wart-like growths on the true vocal cords, rendering the patient nearly aphonic. There was no pain and no sign of malignancy. Patient refused operation. Tuberculosis of the larynx occurred once. Inhalations of oxygen were tried with but little success. Foci gradually developed in the lungs, and patient was sent to Fort Bayard, N. Mex.

Diseases of the skin.—Simple eczema and eczema due to varicose veins are about equally common. Nearly all the former have recovered completely; the latter group are more refractory, but where an excision of the veins has been allowed in 3 cases the eczema has promptly disappeared in all but 1. Rhus poisoning has been seen in about 20 cases. All recovered. Erysipelas cases are 7 in number. These are usually taken in hospital. The face has been the seat of the process in all. A rather rare condition, erythema bullosum, developed in a patient under treatment for myxedema, who was taking thyroid extract (0.325 grams) three times a day. The eruption was limited to the backs of both hands and the wrists. Stopping the thyroid extract produced a decided change for the better, and the patient recovered in about two weeks. Later the extract was commenced again. In a few days 2 small erythematous patches appeared on either wrist about the styloid process of the ulna, but did not assume any bullous characteristics. Among other skin diseases treated here may be mentioned pediculosis corporis and pubis, tinea versicolor, urticaria, syphilitic eruptions of various kinds (usually macular), seborrhea, herpes zoster, folliculitis staphylogenes, dhobie itch, acne vulgaris, warts, callosities, and 1 case of multiple sarcomatosis where there were 40 or 50 small tumors seen on different parts of the body, but mostly on the face and neck. There was 1 case also of lupus vulgaris, easily cured by curettage.

Diseases of the eye and anomalies of refraction form an interesting feature of the clinical work of the Soldiers' Home. The pathological conditions include nearly all those known to the opthalmologist. In the blind room at the Scott Building there are 4 cases of total blindness and 19 cases of partial blindness from various causes, such as detachment of the retina, atrophy of the optic nerve, cataract, glaucoma, retinitis pigmentosa, etc. The errors of refractions are numerous, taking into consideration the fact that they are found in a class of men whose vision was considered normal at enlistment. The number whose latent hyperopia has become manifest after 40 and 45 is surprisingly large, a fact that reveals the flaws in our method of examination in spite of its rigid requirements. Prescriptions were written during the year to correct presbyopia and all the anomalies known under refractive errors.

Gunshot wounds.—The remote effects which occurred in gunshot wounds from the old caliber bullet in the pre-antiseptic era, due to retained projectiles, pieces of clothing, etc., and long-standing suppuration associated with necrosis, are virtually absent in the recent cases. There have been 42 cases of gunshot wounds admitted here during the past two years. They have been distributed to the various regions and structures of the body as follows: Head, 4; chest, 4; arm, 3; forearm, 8; hand, 1; thigh, 8; leg, 4; foot, 4; joints, 9; hip, 2; knee, 3; ankle, 3, and elbow, 1. Three of the cases were struck by 2 bullets each, making 45 wounds in all. Four cases showed multiple wounds, in three of which the ball, after passing through the arm, lodged in the body, the position being unknown in 2 cases. In the third case the ball entered the chest wall between the sixth and seventh ribs, in the mid-axillary line, and passed downward, lodging above the hip joint.

The projectile was of the small caliber type in 37 cases, 27 being Mausers, 6 were Krag-Jörgensens, and 4 were unknown. Large-caliber projectiles occurred in 8 cases, 5 being brass-jacketed Remington, 2 were lead bullets of a similar caliber, and 1 was unknown. Five of the cases resulted from bullets deformed by ricochet.

The distance from the firing line of the enemy was unknown in 12 cases, above 500 yards in 21 cases, and under 20 feet in 4 cases. Of the last group of cases mentioned in 2 the projectile passed through cancellous bone and made simple perforation; in another case the projectile struck a little above the ankle, literally blowing the leg off and necessitating immediate amputation.

The remote effects are chiefly pain, soreness or tenderness in the region of the wound, with more or less weakness and some impairment of motion or paralysis, according to the structures involved and the extent of that involvement. Pain and soreness at the site of the wound occurred 25 times; extending peripherally from the wound, with symptoms or signs of a definite neuritis, 7 times; stiffness of the limb and impaired motion at the joint peripheral to the point of injury occurred 21 times. There was total paralysis of the limb peripheral to the lesion in 5 cases and partial paralysis in 9 cases. Deformities were observed in several cases as a result of the paralyses, and in a few cases as a result of nonuse and faulty position.

Major La Garde closes his report with a number of cases of old gunshot injuries, illustrated by some excellent X-ray photographs, which have been sent to the Army Medical Museum.

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1901, was 34,988. The following statement shows in detail the additions and changes in the different sections.

Pathological section:	
In museum June 30, 1900	11,877
Received during the year	276
In museum June 30, 1901	12,153
Anatomical section:	
In museum June 30, 1900	1,540
Transferred to other institutions	3
	1,537
Received during the year	15
In museum June 30, 1901	1,552
Section of comparative anatomy:	
In museum June 30, 1900	1,432
In museum June 30, 1901	1,432

Microscopical section:

In museum June 30, 1900	12,891
In museum June 30, 1901	12,891

Miscellaneous section:

In museum June 30, 1900	2,494
Received during the year	40
In museum June 30, 1901	2,534

Provisional pathological section:

In museum June 30, 1900		2,058
Discarded	1	
Transferred to other institutions	731	
		732
In museum June 30, 1901		1,326

Provisional anatomical section:

In museum June 30, 1900	756
Transferred to other institutions	78
In museum June 30, 1901	678

Photographic series:

In museum June 30, 1900	2,372
Received during the year	50
In museum June 30, 1901	2,422

Recapitulation.

Specimens in museum June 30, 1900	35,420
Discarded and transferred	813
	34,607
Added during the year	381
Specimens in museum June 30, 1901	34,988

The following are some of the more interesting specimens received during the fiscal year:

12143. Double human monster, from San Juan, Porto Rico. Contributed by Capt. J. L. Vina, United States Volunteers.

12120. The Texas screw worm, which carries the Texas cattle-fever germ. Contributed by Capt. J. H. Stone, assistant surgeon, United States Army.

12038–12044, 12005, 12073–12077, 12083, 12084, 12087–12090, 12093–12101, 12106–12109, 12242, 12243, 12246. Specimens from cases of bubonic plague. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12035–12037, 12052–12055, 12061–12064, 12069–12072, 12110–12117. Specimens from cases of leprosy. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12049–12051, 12091, 12250–12253. Specimens from cases of beri-beri. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12247–12249, 12255, 12256. Specimens from cases of chronic amœbic dysentery. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12254, 12257, 12258. Specimens from cases of acute specific dysentery. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12056, 12085, 12086. Spleen and kidney from cases of pernicious malarial fever. Obtained in Manila, P. I., by Dr. E. R. Hodge.

11987–11990. General tuberculosis in a soldier who had contracted dysentery in Manila, P. I. There were perforating tubercular ulcers of ileum and appendix, girdle ulcers of large intestines, tubercular ulcers of urinary bladder, tubercles of lungs, liver, mesenteric glands, and kidneys. The heart was unusually small—but 200 grams. Contributed by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army.

12206. Plaster cast of face of the late William H. Seward, taken after the attempted assassination, showing facsimile of apparatus applied for fracture of jaw. Contributed by J. A. Bishop, D. D. S., New York, N. Y.

12154. Fragment of skull found lying against the brain forty-four years after shot fracture. No sequelæ of the injury. Contributed by Dr. J. Ford Thompson, Washington, D. C.

12031. Direct and indirect shot fracture of lower jaw of dog. Contributed by Dr. Cecil French, Washington, D. C.

12142, 12020. Two cases of shot fracture of thoracic vertebræ in soldiers. 12142, death occurred thirty hours after injury. Contributed by Dr. A. S. Kennedy, contract surgeon, United States Army. 12020, death occurred almost instantaneously from hemorrhage. Contributed by Lieut. A. E. Truby, assistant surgeon, United States Army.

12027, 12028. Two cases of sarcoma of bone and amputation. 12027, of the ulna of a girl of 14; contributed by Dr. W. M. Gray, Washington, D. C. 12028, of the humerus of a man, age 58; contributed by Dr. A. A. Snyder, Washington, D. C.

12201. Repeated trephining of temporal bone in case of otitis media and sigmoid sinusitis. Death. Contributed by Dr. E. O. Belt, Washington, D. C.

12129. Hemorrhagic separation of layers of dura mater. Contributed by Dr. D. S. Lamb, Washington, D. C.

12155. Mummified brain of Mound Indian of two hundred years ago, showing convolutions. Contributed by Mr. Clarence B. Moore, Philadelphia, Pa.

12016 and 12193. Glioma of brain removed from man, age 28. Two operations. Recovery, with partial use of muscles. Contributed by Dr. D. P. Hickling, Washington, D. C.

12161, 12162. Meningitis and endocarditis following pneumonia, and caused by diplococcus pneumoniæ. Contributed by Dr. D. S. Lamb, Washington, D. C.

12018. Fatal cancer of pleura, secondary to cancer of breast, which had been removed. Woman, age 68. Contributed by Dr. I. H. Lamb, Washington, D. C.

12032, 12033. Fatal pericarditis in a cow, caused by the passing of a piece of wire from stomach to pericardium. Contributed by United States College of Veterinary Surgeons, Washington, D. C.

12017. Rupture of fatty heart of man, age 65. Contributed by Dr. W. E. Whitson, Washington, D. C.

12182, 12183. Hypertrophy of heart and thyroid gland. From a case of general tuberculosis. Contributed by Dr. D. S. Lamb, Washington, D. C.

12013, 12176. Two cases of aneurism of arch of aorta, in which wire was introduced with temporary benefit. 12013, from a man, age 40. Contributed by Dr. W. W. Johnston, Washington, D. C. 12176, a man, age 55. Contributed by Dr. H. A. Robbins, Washington, D. C.

12147. Rupture of spleen in a soldier. Cause unknown. Contributed by Capt. D. C. Howard, assistant surgeon, United States Army.

12003. Plaster cast showing operation for cleft palate. Contributed by Dr. Thomas Fillebrown, Boston, Mass.

12131. Odontoma, weighing 5½ ounces, from jaw of a young steer. Contributed by Dr. John S. Marshall, Chicago, Ill.

12132. Cementoma, weighing 59 ounces, from jaw of a 2-year-old colt. Contributed by Dr. John S. Marshall, Chicago, Ill.

12261. Side of face removed, post mortem, from case of noma. Contributed by Major L. C. Carr, brigade surgeon, United States Volunteers.

11995. Salivary calculi (lime phosphate and organic matter), from abscess near Wharton's duct. Contributed by Capt. A. E. Bradley, assistant surgeon, United States Army.

12139, 12184. Two cases of fatal hemorrhage from stomach. 12139, from a man, age 47; multiple erosions of mucous membrane. Contributed by Dr. M. A. Parsons, Washington, D. C. 12184, from a dog; stomach deeply congested. Contributed by Dr. Cecil French, Washington, D. C.

12034. Gastro-enterostomy in a man, age 45; for cancer of stomach. Death on sixth day. Contributed by Dr. I. S. Stone, Washington, D. C.

11996–12002. Experimental hog cholera. Portions of ileum and colon, showing congestion, thickening, necrosis, and grayish false membrane (mucosa). The hogs were fed, some with bacillus choleræ suis, others with bacillus icteroides (Sanarelli). Contributed by Maj. Walter Reed, surgeon, United States Army, and Contract Surgeon James Carroll, United States Army.

12158. Inguinal hernia in a dog, which occurred just after labor. The sac included both intestine and uterus. Contributed by Dr. Cecil French, Washington, D. C.

12174. Fatal hemorrhage from small intestine in influenza. Contributed by Dr. M. A. Parsons, Washington, D. C.

12183. Fatal purulent peritonitis in intestinal obstruction, the cause of which had disappeared at post mortem. Man, age 45. Contributed by Dr. D. S. Lamb, Washington, D. C.

12011, 12173, 12177. Three cases of cancer of head of pancreas. 12011, from a man, age 49. Contributed by Dr. D. G. Lewis, Washington, D. C. 12173, man, age 73. Contributed by Dr. Amelia Erbach. 12177, man, age 65. Contributed by Dr. D. S. Lamb, Washington, D. C.

11991, 11992. Gas bacillus dilatation of liver. Contributed by Dr. James Carroll, contract surgeon, United States Army.

12148. Liver of yellow fever. Contributed by Dr. James Carroll, contract surgeon, United States Army.

12078. Hydatid cysts of liver. Contributed by Dr. E. R. Hodge, Washington, D. C.

12105. Subperitoneal hemorrhage of liver in typhoid fever. Contributed by Dr. E. R. Hodge, Washington, D. C.

12124. Hydronephrosis in a new-born child. Contributed by Dr. T. C. Smith, Washington, D. C.

12198. Successful nephrectomy, for renal tuberculosis. Man, age 20. Contributed by Dr. E. J. Whitehead, Columbiana, Ohio.

12014. Miliary tuberculosis of kidney in boy, age 3 years. Contributed by Dr. J. Ford Thompson, Washington, D. C.

12200. Prostatectomy; removal of 165 grams of the gland. Man, age 56. Death on fifth day. Contributed by Dr. A. A. Snyder, Washington, D. C.

12137, 12138. Abscess of Fallopian tube and ovary, followed by fatal purulent pericarditis. Woman, age 19. Contributed by Dr. D. S. Lamb, Washington, D. C.

12019. Human ovum of 11 weeks, which was conceived after bi-lateral ligation of Fallopian tubes. Contributed by Dr. W. A. Frankland, Washington, D. C.

12135. Placenta velamentosa. Contributed by Dr. V. E. Watkins, contract surgeon, United States Army.

12241. Fibro-sarcoma removed from abdominal wall of soldier. Contributed by Capt. H. M. Hallock, assistant surgeon, United States Army.

12007–12008. Two specimens of keratolysis. 12007, from man, age 50, who had been a soldier eleven years and was discharged because of the disease. Had had it since early infancy. Contributed by Dr. R. M. Stone, Omaha, Nebr. 12008, from a woman, age 60, who had had the disease seventeen years. Contributed by Dr. E. W. Reisinger, Washington, D. C.

12157. Remarkable cuticular hypertrophy of hoof of horse, following laminitis. Contributed by United States College of Veterinary Surgeons, Washington, D. C.

12207–12240. Series of models showing diseases of skin, mainly the rarer forms. Prepared by J. Baretta, Paris.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year 1900–1901:

Description.	On hand June 30, 1900.	Added during fiscal year.	Total, June 30, 1901.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	40,418	1,463	41,881
Medical transactions	6,292	367	6,659
Bound theses	2,054	80	2,134
Bound pamphlets	2,754	51	2,805
Other medical books	84,377	2,683	87,060
Total	135,895	4,644	140,539
Medical theses	62,138	1,756	63,894
Medical pamphlets	166,379	6,455	172,834
Total	228,517	8,211	236,728

Of the total number of theses on hand June 30, 1900, there were 1,093, bound in 80 volumes, and 275 pamphlets, bound in 43 volumes, during the year.

There were presented to the library during the year 483 books and 9,291 pamphlets and journals.

Volume VI, second series, of the Index-Catalogue includes the letters G and H from G to Hernette, and forms a volume of 1,051 pages. It will be ready for distribution at the usual time. The appropriation for Volume VII, second series, having been made, the manuscript is in course of preparation for the printer.

MEDICAL OFFICERS.

UNITED STATES ARMY.

The total number of regular medical officers allowed by law under the Army reorganization act (approved February 2, 1901) is 321; number in service June 30, 1901, 245; number of vacancies on that date, 76.

Appointments.—Fifty-seven appointments as first lieutenants and assistant surgeons were made during the year with one appointment as captain and assistant surgeon, the incumbent in this special case having been retired on the date of his appointment.

Promotions.—Five officers were promoted from lieutenant-colonel and deputy surgeon-general to colonel and assistant surgeon-general; 8 from major and surgeon to lieutenant-colonel and deputy surgeon-general; 20 from captain and assistant surgeon to major and surgeon; and 5 from first lieutenant and assistant surgeon to captain and assistant surgeon.

Retirements.—Three colonels and assistant surgeons-general and 2 captains and assistant surgeons (retired with the rank of major).

Deaths.—One colonel and assistant surgeon-general, 2 majors and surgeons, and 1 first lieutenant and assistant surgeon.

Resignation.—One first lieutenant and assistant surgeon.

The appointments were made on the recommendation of examining boards in session in San Juan, P. R.; Manila, P. I.; Washington, D. C.; and San Francisco, Cal.

Summary of work of the Army medical board convened in San Juan, P. R., on August 6, 1900.

Number of candidates invited to appear	7
Approved	2
Physically disqualified	2
Rejected	1
Withdrew	2

Summary of work of the Army medical board convened in Manila, P. I., on April 16, 1900.

Number of candidates invited to appear	154
Declined to appear	1
Number of candidates examined	153
Approved	[1]46
Physically disqualified	33
Rejected	29
Withdrew	45

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[1] Includes 16 mentioned in last annual report, 1 of whom died before appointment.

Summary of work of the Army medical board convened in Washington, D. C., on February 11, 1901.

Number of candidates invited to appear	191
Declined to appear	19
Failed to appear	45
Requirements unfulfilled	1
Number of candidates examined	126
Approved	21
Physically disqualified	45
Rejected	51
Withdrew	9

Summary of work of the Army medical board convened in San Francisco, Cal., on February 11, 1901.

Number of candidates invited to appear	19
Declined to appear	5
Failed to appear	5
Number of candidates examined	9
Approved	4
Physically disqualified	1
Withdrew	4

It is gratifying to note that although the percentage of candidates approved by the boards recently in session is 24.84 as compared with 19.23 approved by the boards in session during the ten years 1889–1898, inclusive, there has been no lowering of the standard of admission. So many of the recent candidates were young men who had proved their capabilities, physical and professional, by one or more years of active service as volunteer or contract surgeons that the ratio of successful candidates was necessarily higher among them than among the young medical graduates who came before the earlier boards. Few of those who appeared before the board in session in Washington, D. C., had previous service, and among them the ratio of approved candidates was only 16.67 per cent as compared with 19.23 per cent during the decade cited.

The following table shows the comparative work of these boards:

Statistics of examinations by Army medical boards held during the ten years from January 1, 1889, to December 31, 1898, compared with those held during 1900 and 1901.

[NOTE.—There were no examinations during 1899.]

Boards.	Invited.	Declined to appear.	Failed to appear.	Requirement unfulfilled.	Number examined.	Approved.	
						Number.	Per cent.
1889–1898.							
Total, 10 years	639	24	121	....	494	95	19.23
1900.							
Havana, Cuba	16	....	1	....	15	4	26.67
San Juan, P. R	7	....	....	....	7	2	28.57
1900–1901.							
Manila, P. I	154	1	....	....	153	46	30.06
1901.							
Washington, D. C	191	19	45	1	126	21	16.67
San Francisco, Cal	19	5	5	....	9	4	44.44
Total, 1900–1901	387	25	51	1	310	77	24.84

Statistics of examinations by Army medical boards, etc.—Continued.

Boards.	Physically disqualified.		Rejected. (Other causes than physical.)		Withdrew.		Ratio approved to—	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Physically disqualified.	Rejected and withdrew.
1889–1898.								
Total, 10 years	127	25.71	198	40.08	74	14.98	1 : 1.34	1 : 2.86
1900.								
Havana, Cuba	....	....	10	66.67	1	6.67	1 : 0	1 : 2.75
San Juan, P. R.	2	28.57	1	14.29	2	28.57	1 : 1	1 : 1.50
1900–1901.								
Manila, P. I	33	21.57	29	18.96	45	29.41	1 : 0.71	1 : 1.61
1901.								
Washington, D. C	45	35.71	51	40.48	9	7.14	1 : 2.14	1 : 2.86
San Francisco, Cal.	1	11.11	....	....	4	44.44	1 : 0.25	1 : 1
Total, 1900–1901	81	26.13	91	29.35	61	19.68	1 : 1.05	1 : 1.97

MEDICAL OFFICERS OF VOLUNTEERS.

All medical officers of the volunteer staff appointed under the Act of Congress approved March 2, 1899, were mustered out of service on June 30, 1901, and all regimental surgeons and assistant surgeons were mustered out on the same date, except the medical officers of the Forty-seventh Infantry, United States Volunteers, who were mustered out on July 2, 1901.

Under the Act approved February 2, 1901, there were appointed for service in the Division of the Philippines 50 surgeons with the rank of major (of whom 8 are captains and assistant surgeons, United States Army), and 150 assistant surgeons with the rank of captain. One major and surgeon and 2 first lieutenants and assistant surgeons died during the year.

CONTRACT SURGEONS, UNITED STATES ARMY.

There were in service June 30, 1900, 462 contract surgeons. During the year ended June 30, 1901, contracts were made with 265 physicians; 333 contracts were annulled and 7 terminated by death, leaving in service June 30, 1901, 387 under contract. Of this number 106 were on duty in the United States, 17 on transports, 14 in Cuba, and 250 in the Philippine Islands.

The following tabulation shows the number of contracts with physicians made from April 17, 1898, to December 31, 1900, classified by length of service:

	Out of service.	In service.	Total.
Served under one month	36	4	40
Served one to six months	342	132	474
Served six to twelve months	143	99	242
Served one to two years	119	115	234
Served over two years	27	179	206
Total	667	529	1,196

Total number serving in 1898	771
Daily average serving in 1898	344
Total number serving in 1899	670
Daily average serving in 1899	412
Total number serving in 1900	658
Daily average serving in 1900	482

Average service of the 667 out of service, seven months, twelve days.
Average service of the 529 in service, one year, four months, fourteen days.
Average service of the 1,196 contract surgeons, eleven months, twelve days.

The seven who died during the fiscal year 1900–1901 were: Charles Roemmelt, July 20, 1900, malarial fever; Frederick W. Hulseberg, August 1, 1900, killed by insurgents; Jesse W. Lazear, September 25, 1900, yellow fever; Charles A. Ross, February 2, 1901, killed by insurgents; James A Rabbett, February 20, 1901, eruptive fever; Sherman A. Yule, March 4, 1901, nephritis; Charles St. John, May 22, 1901, killed by insurgents.

CONTRACT DENTAL SURGEONS.

The corps of 30 contract dental surgeons authorized by the Act of Congress approved February 2, 1901, is in progress of formation. Up to June 30, 1901, only 17 had been employed, and 3 of these were the supervising dental surgeons who constituted the examining board for this service. Of the 14 who passed the examining board and were given contracts for three years, 1 was assigned to the Department of Cuba, 11 to the division of the Philippines, and 2 were stationed at posts in the United States.

ARMY MEDICAL SCHOOL.

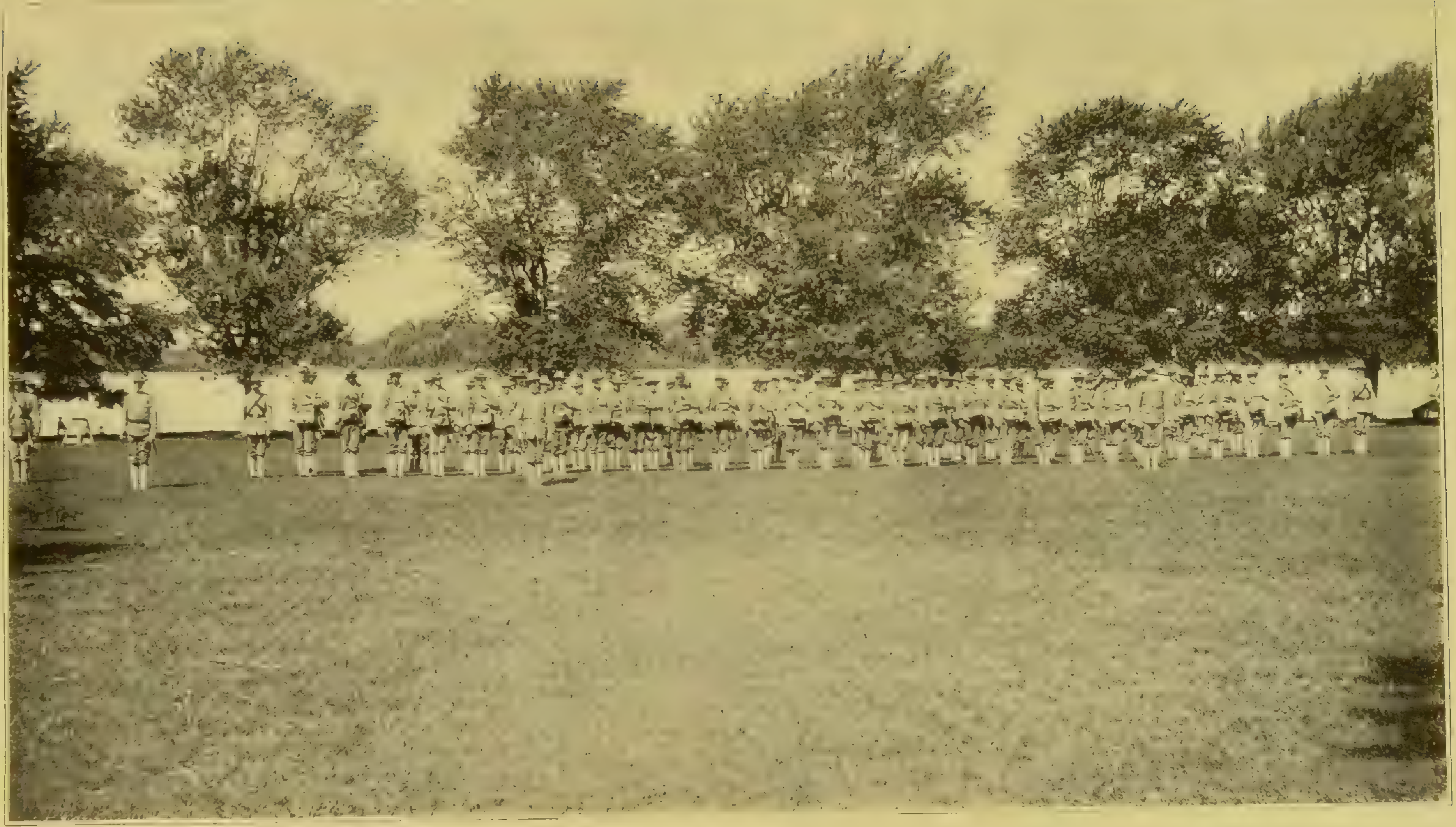
Existing conditions in the army medical department rendered it impracticable to carry out the usual school programme during the session of 1900–1901.

THE HOSPITAL CORPS.

On June 30, 1900, the Hospital Corps consisted of 167 hospital stewards, 381 acting hospital stewards, and 3,543 privates, a total of 4,091 enlisted men. During the fiscal year ending June 30, 1901, the corps gained by enlistment and reenlistment 844, by transfer from the line 221, by surrender from desertion 11, and by apprehension from desertion 6, a total of 1,082, and during the same period it lost 837 men, as follows: 417 by expiration of term of service, 137 by discharge by order, 47 by sentence of general court-martial, 97 by discharge on surgeon's certificate of disability, 16 by retirement, 16 by retransfer to the line, 63 by desertion, 2 killed in action, 36 by death due to disease, 3 by drowning, and 3 by suicide, leaving in service June 30, 1901, 246 hospital stewards, 388 acting hospital stewards, and 3,702 privates, a total of 4,336.

Hospital stewards.—The act of Congress approved May 26, 1900 (General Orders, No. 76, Headquarters of the Army, June 1, 1900), increased the number of hospital stewards by 100, making a total allowance of 200. There being an excess of 67 hospital stewards in service (remaining from those authorized during the Spanish-American war), only 33 vacancies required to be filled. An examination was held during August, 1900, for which 40 applications were received. Of this number 3 declined examination, 1 withdrew, 2 were not recommended by the examining board, 14 failed to pass, and 20 were found qualified and appointed.

To replace the loss of hospital stewards that would be occasioned by the muster out of the volunteer regiments, Congress (Act approved February 2, 1901) allowed an additional 100 hospital stewards (making a total of 300), "provided that men who have served as hospital stew-



COMPANY OF INSTRUCTION, HOSPITAL CORPS, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., 1901

ards of volunteer regiments or acted in that capacity during and since the Spanish-American war for more than six months, may be appointed hospital stewards in the Regular Army; provided, further, that all men so appointed shall be of good moral character and shall have passed a satisfactory mental and physical examination." Fifty of the new appointments were allotted to the Division of the Philippines, and on February 16, 1901, the chief surgeon there was directed by cable to examine and recommend hospital stewards of volunteers and acting hospital stewards, Hospital Corps, United States Army, for promotion to the grade of hospital steward in the regular establishment. Upon his recommendation 27 candidates, who there successfully passed the required examination, were appointed up to June 30, 1901. To fill the remaining vacancies examinations were held in the United States, Cuba, and Porto Rico in March, 1901. Of the 60 applicants for these examinations, 5 declined, 2 failed to report, 13 were not recommended by the board, 9 failed to pass, 31 were passed; 30 were appointed, and 1 who had passed was discharged by expiration of service, not availing himself of this opportunity for promotion.

Acting hospital stewards.—Heretofore the examinations of privates of the corps for promotion to the grade of acting hospital steward were authorized directly by the Surgeon-General in each case. This method consumed considerable time and frequently caused delay in filling existing vacancies. To avoid this, department authorities were authorized to make these details, after examination as required by the regulations, without first requesting authority from the Surgeon-General, provided the allowance of acting hospital stewards and privates for each command be not exceeded, except by special authority of the Secretary of War. This has relieved this office of a considerable amount of work which is now quite as well done and with greater advantage to the service, in the offices of the different chief surgeons t the headquarters of the military departments. Questions for these xaminations are prepared by the chief surgeon and copies thereof, as well as of the report of the examining board, are furnished the Surgeon-General in each case.

Recruitment.—Owing to an increased demand for men of the Hos ital Corps for duty in the Division of the Philippines and with the hina relief expedition, general recruiting officers and attending sur eons stationed at important points were granted authority, in July, 900, to enlist desirable men for the corps, especially for foreign ervice, without reference to this office. The number required having een obtained, this general authority was withdrawn about September , 1900, and thereafter authority for enlistments was granted only in ses where men had previous service in the Army or were exceptionly desirable by reason of education, character, and physique.

To meet the current requirements of the corps, recruiting was sumed in the early part of January, 1901, and by the end of March sufficient number of men had been enlisted for this purpose, hen general recruitment was again suspended, and remains so up to e present time. Recruiting officers were cautioned to accept none t desirable men for the Hospital Corps, particular stress being laid on the necessity for good education and physique, and waiving only ght deviations from the physical standard for vision in cases of ung applicants in whom refractive errors could be entirely corrected glasses. As a whole, the recruiting service for the corps has been satisfactory, a very small percentage of recruits being found unfit for service after a trial of several months. All men enlisted for the Hospital Corps at rendezvous east of the Mississippi River were sent to the company of instruction, Hospital Corps, Washington Barracks, and others to the school at Fort McDowell, Angel Island, Cal. In addition to this source of supply, chief surgeons were authorized (letter of the Surgeon-General dated December 19, 1900) to enlist and reenlist men up to the regulation allowance of their departments without reference to this office. Up to the present but a small proportion of enlistments has been made in the departments, but it is hoped that presently matters will so shape themselves that the home departments will be able to take care of themselves, leaving to this office only the responsibility for the supply of commands outside the continent.

Distribution.—The number of posts and stations requiring the service of men of the Hospital Corps was about 146 in the United States, Cuba, and Porto Rico, and about 438 in the Division of the Philippines—the number varying more or less at short intervals; a total of about 568. In addition thereto, 7 arsenals and 4 general hospitals in the United States, 1 in the Hawaiian Islands, 1 in Japan (Nagasaki), and the hospitals in China, together with the transport service, had to be supplied with the necessary Hospital Corps personnel. To supply these stations and the great number of small field commands in the Division of the Philippines, the number of men of the Hospital Corps had to be somewhat increased during the fiscal year. A corresponding reduction is now gradually going on which will soon bring the number of men in the corps to the lowest percentage required by the distribution of the strength of the Army, now fixed at about 77,287, for which number it is estimated that 300 hospital stewards, 343 acting hospital stewards, and 2,571 privates; total, 3,214 will be sufficient. If, however, the Hospital Corps is expected to meet the sanitary requirements of the Porto Rican Provisional Regiment and 13,000 native troops authorized in the Philippines, its total strength can not be much less than 3,800.

The number of men of the Hospital Corps actually required in the different sanitary organizations has never been definitely laid down in regulations. Paragraphs 1409 and 1410, Army Regulations 1895, prescribed the number allowed to posts, which was based upon the number of companies constituting the garrison, rather than their strength, which is an uncertain quantity. In paragraphs 1605 and 1606, Army Regulations 1901, the allowance is based upon actual strength, and the proportion of noncommissioned officers is definitely established. It must be understood, however, that this applies only to the army in garrison. In active service the requirements will probably not be less than 5 per cent of the fighting effective.

The number and distribution of detachments of the Corps in the last quarter of the fiscal year were about as follows:

United States	118	Transports	19
Porto Rico	3	China	1
Alaska	7	Philippines	294
Cuba	18		
Hawaiian Islands	1	Total	461

Uniform and equipment.—In compliance with General Orders, No. 19, February 21, 1901, from the Headquarters of the Army, the insignia of the Hospital Corps was changed to conform to that of the Medical Department, following the custom obtaining in all other branches of the service, where the insignia worn by the officer and enlisted soldier are identical in form. The arm brassards with the red cross remaining on hand will be available in any war with a signatory of the Geneva Convention for use in the field by all who may be neutralized by the terms of that convention. No change in equipment was made during the year, but to facilitate the transfer of fully-equipped men from one command to another, particularly in active service, paragraph 1604, Army Regulations, was promulgated. This paragraph prescribes the equipment and the method of transferring the accountability for it in changing stations. It is believed that this is a great improvement upon the regulation heretofore obtaining, which during the Spanish-American war was proved to be impossible to enforce.

In this connection, I would respectfully invite attention to the necessity for some change in the regulations governing descriptive lists, particularly in their application to the Hospital Corps. The very elastic organization of this body and the loose local attachment of its members, which are particularly apparent in active service, render necessary the adoption of some rule which will assure a reasonably intimate companionship between the man and his descriptive list.

During the year unusual attention has been given to the instruction of the men of the Hospital Corps, it being realized that a considerable part of the success of the department depends upon this important organization. Of the nearly 5,000 men now constituting the corps, a very large part entered the service since 1897, and but few of them, from the necessities of the situation, could receive the careful training given the sanitary soldier in our Army before the Spanish-American war. To be sure, they were no worse off in this respect than the men of the other branches of the service, but their individual responsibility is so much greater that lack of training became more apparent.

In a letter dated December 19, 1900, I indicated to the chief surgeons my desire to make them responsible, so far as practicable, for the recruitment, discipline, and instruction of the Hospital Corps in their respective departments, a plan which had recently been carried out with excellent results in the departments without the United States. I also directed that the provisions of paragraph 1413, Army Regulations 1895, as amended (par. 1609, A. R. 1901), should be strictly enforced and that a suitable course of instruction be prescribed covering five hours weekly, of which a report in detail should be submitted with the monthly return of the Hospital Corps.

During the year detachments of instruction were reestablished at the following-named stations: Fort Columbus, New York Harbor; Fort Sheridan, Ill.; Fort Snelling, Minn.; Fort Leavenworth, Kans.: Fort Sam Houston, Tex.; Fort Logan, Colo.; Vancouver Barracks, Wash.

Prior to April, 1898, detachments of instruction were maintained at some of the principal posts in the West. The withdrawal of troops during the Spanish-American War caused not only a temporary cessation of instruction, but in most cases a discontinuance of these detachments. In the fall of 1900, surgeons serving at the above-named posts were notified to reestablish at once these detachments and the required course of instruction. To put the Department of the East on an equal footing with those of the West, six additional privates were allowed in December, 1900, to Fort Columbus for the purpose of instruction and to meet any emergencies in that department. The course of instruction in these detachments was prescribed by the chief surgeons who were especially charged with their supervision. No special reports regarding them have yet been received.

Schools of instruction.—Schools of instruction were maintained at the Army General Hospital, Washington Barracks, D. C.; at Fort McDowell, Cal. (Angel Island), and at Hospital No. 3, Manila, P. I. Most valuable work has been done in these organizations, which are now all running on a high plane of efficiency. As heretofore stated, owing to the demands of the service abroad, especially the sudden outbreak in China, not only were the companies of instruction in the United States depleted, but even the post detachments were temporarily reduced to the lowest practicable limits. The company of instruction at Washington Barracks, under command of Capt. E. L. Munson, assistant surgeon, United States Army, had thereafter but a nominal existence until recruiting was again begun. On March 16, when Maj. F. P. Reynolds, surgeon, United States Volunteers (assistant surgeon, United States Army), assumed command, the strength of the company had reached 183. The curriculum and interior economy at this school are set forth in the following report by Major Reynolds, under date August 29, 1901:

I. LENGTH OF TIME THE COURSE OF INSTRUCTION IN THE SCHOOL SHOULD CONTINUE.

The course of instruction in this company has been one of three months, at the end of which time the men were sent to San Francisco for foreign service. Of late the demand for men has been less, so that transfer at the end of the course has not been necessary in all cases. Advantage was taken of this to establish a fourth month or graduate class, and also to supply the hospitals with a liberal allowance of men who had been through the course of instruction.

For the last detachment ordered for foreign service it was therefore possible to select one-third of the men from the detachment on duty in the hospital and who had been under instruction for one month or more, and the remainder from the "graduate" class in the company.

It is my opinion that the course of instruction in a company of instruction should extend over at least four months. The instruction of the fourth month should be largely practical in character to firmly fix in the mind the theoretical instruction of the previous months by making a practical application of it.

There has been six hours' daily instruction (exclusive of Saturday and Sunday) during the summer months, about equally divided between outdoor and indoor work. During the remainder of the year the time will be reduced to five and one-half hours by reducing the amount of outside instruction. There has been no indication that these hours are too long or that better results would be obtained by a shorter day. With the exception of the occasional suspension or reduction of outside work during stormy or excessively hot weather or for field sports, this outline has been followed for the past six months. In stormy weather the hours for outside drill have been devoted to study.

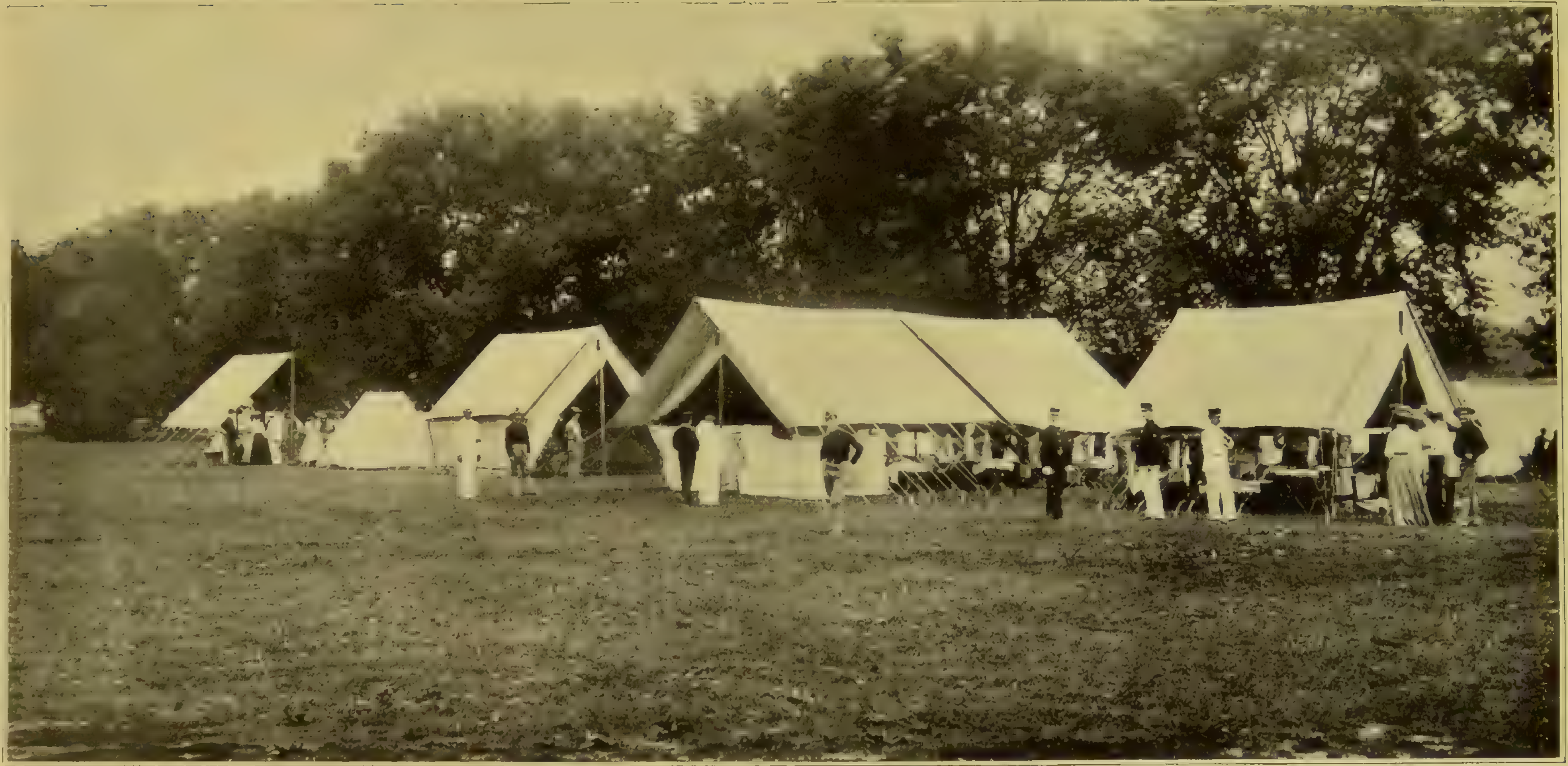
II. CHARACTER OF INSTRUCTION.

The following outline of the present course of instruction in this company is submitted as embodying my ideas on the subject:

SCHEDULE OF INSTRUCTION.

First three months:

- Setting-up drill, all classes, daily, one-half hour.
- Company drill, all classes, daily, one-half hour.
- Bearer drill and field work, daily, first and second months, 1¾ hours; third month, 1 hour.
- Anatomy and physiology, daily, first month, 1 hour.
- Nursing and ward management, daily, 1 hour, second month.
- Bandaging, daily, first month, 1 hour.



REGIMENTAL FIELD HOSPITAL—FIELD EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., 1901.

First aid, daily, second and third months, 1 hour.
Diet cooking, daily, second month, 1 hour.
Materia medica and pharmacy, daily, third month, 2 hours.
Clerical work, twice a week, third month, 1 hour.
Care of animals, twice a week, third month, 1 hour.
Elementary hygiene, daily, first month, 1 hour.

Fourth month:

Setting-up drill, daily, one-half hour.
Company drill, daily, one-half hour.
Bearer drill, daily, 1 hour.
Care of animals, twice a week, 1 hour.
Materia medica and pharmacy, daily, 1 hour.
Clerical work, daily, 1 hour.

Setting-up drill or calisthenics, as given here, consists of the usual setting-up exercises of the Infantry Drill Regulations, with the addition of a number of exercises taken from the Manual of Calisthenic Exercises devised by Lieutenant Koehler, master of the sword, at the United States Military Academy. Attended by all classes.

Company drill is attended by all classes and includes definitions, general principles, school of the soldier, the squad, and school of the company, including movements by platoons as laid down in Infantry Drill Regulations. Manual of arms, firings, and bayonet exercises are of course not included.

Bearer drill includes everthing laid down in the Drill Regulations for the Hospital Corps. The course is graded and covers three months.

Bearer drill and field work.—All classes. First month: Drill Regulations, paragraphs 50–113. Recitations on these paragraphs. Duty of each member of the squad. Drill with unloaded litter. Drill with loaded litter.

Second month: Paragraphs 113–165. Recitations on these paragraphs. Loaded itter over obstacles. Loaded litter upstairs. Loaded litter downstairs. To load with reduced numbers. Improvisation of litters. To remove wounded without itters. To place patient on horseback. The use of the travois. Ambulance drill. To prepare and load ordinary wagons.

Third month: Tent drill and packing. Shelter tent. Clothing roll. First-aid work in the field.

The course of instruction of each month has been concluded with public field exercises, the preparation for which has occupied the drill hours of the first class during the last week of the course.

The concluding feature has been an exhibition of some work of the Medical Department in active service; a regimental field hospital has been established and all departments completely organized for work, including the preparation of light diets; he work of a brigade section of an ambulance company has been shown by the establishment and operation of dressing and ambulance stations.

These exercises have increased the men's interest in their work to a marked degree, and have been beneficial in many other ways. On each occasion there has been a considerable attendance of officers and their families and civilians from the city.

FIELD GRADUATING EXERCISES OF THE FIRST CLASS, APRIL 27, 1901.

1. Company drill, platoon formations, 10 minutes.
2. Litter drill, all classes, unloaded litter, 10 minutes.
3. Litter drill by classes, 20 minutes. First class: First aid in the field, search for wounded, method of exposing wounds, applying first-aid dressings, application of extemporized splints, transporting patient by litter and ambulance to dressing station. Second class: Litter drill with loaded litter; squads acting independently—upstairs, downstairs, obstacles; removing wounded without litters. Third class: Litter drill with unloaded litter (without slings); commands; change bearers; posts; oading patient on litter, and unloading.
4. Exhibition drill, manual of unloaded litter, by detachment for Pan-American Exposition.
5. Exhibition tent pitching, detachment for Pan-American Exposition.

FIELD EXERCISES, MAY 29, 1901.

1. Company exercises: (*a*) Calisthenic class (A. H. S. Howe, instructor). (*b*) Company drill.
2. Bearer drill by classes: (*a*) (First class:) Shelter-tent pitching. (*b*) (Second class:) Drill with loaded litter (A. H. S. Howe, instructor). (*c*) (Third class:) Exercises with triangular bandage (A. H. S. Eiseman, instructor.)

3. Practical field work by first and second classes—showing the work at the front by a brigade section of an ambulance company: (*a*) Establishment of a dressing station. (*b*) Establishment of an ambulance station. (*c*) The work on the firing line: First aid in the field, removing wounded by litter, on horseback, by blanket litter, and without litter by one or more bearers.

FIELD EXERCISES JULY 2, 1901.

1. Calisthenic class.
2. Company drill.
3. Bearer drill by second class.
4. Exercises with the triangular bandage by the third class.
5. Practical field work by the first class: (*a*) Establishment and organization of a regimental hospital. (*b*) First aid in the field.

Elementary anatomy, physiology, and hygiene are taught during the first month by demonstrations, lectures, and recitations. A skeleton and an excellent manikin are used.

Bandaging is also taught during the first month by one hour's practical work daily.

ANATOMY AND PHYSIOLOGY (FIRST MONTH).

[Text-books: Smart's Handbook for the Hospital Corps; Doty's Prompt Aid to the Injured.]

1, 2, 3. Anatomy of the skeleton. 4. The muscular system. 5. Review. 6. The nervous system. 7, 8, 9. The circulation of the blood. 10. Review. 11, 12. The respiratory system. 13, 14. The alimentary system. 15. Review. 16. Organs of excretion. 17. Organs of reproduction. 18. Organs of special sense. 19. Review. 20. General review.

BANDAGING (FIRST MONTH).

1. Figure of eight, gauntlet. 2. Spica of the thumb, spiral reverse of the upper extremities. 3. Spica of shoulder, single. 4. Spica of shoulder, double. 5. Spica of the foot, covering the heel. 6. Spiral reverse and figure of eight, lower extremity. 7. Spica of groin, single. 8. Spica of groin, double. 9. Barton's head bandage. 10. Velpeau bandage.

ELEMENTARY HYGIENE (FIRST MONTH).

1. Disinfection and contagious diseases (Smart, pars. 534–560; Doty, pars. 91–109). 2. Hygiene (Doty, pars. 207–222). 3. Field service (Smart, pars. 63–110; Soldier's Handbook, pars. 83–89).

DIET COOKING.

The course in diet cooking is given by Miss Elizabeth Stack, a professional nurse and dietist. Each member of the class during the month prepares the various articles of light diet as laid down in the Manual of Emergency Diet, devised by Captain Munson, assistant surgeon, United States Army.

The various ways of utilizing the articles of the travel, field, and garrison rations for the use of the sick form an important feature of this course.

NURSING AND WARD MANAGEMENT (SECOND MONTH).

[Text-book, Clara Week's Nursing.]

Nursing and ward management are also taught by Miss Stack.

1. Care and management of ward. 2. Beds and bed making. 3. Admission of patient, care of effects. 4. Observation of symptoms. 5. Thermometers, charting of temperature. 6. Observation and recording of pulse and respiration. 7. Baths and bathing. 8. Preparation of enemata and administration. 9. Disinfectants, care of utensils, sputa cups, bedpans, urinals, etc. 10. Medicine and its administration. 11. Preparation of patient for operation. 12. Treatment of inflammation, medical and surgical. 13. Asepsis, antisepsis. 14. Ward dressings, surgical and medical. 15. Ward emergencies. 16. Nursing in typhoid fever. 17. Nursing in contagious diseases. 18. Nursing in convalescence. 19. Dissolution, care of body, autopsy. 20. Review.

FIRST AID.

First aid is taught by lectures and recitations during the second month and by demonstrations and practical exercises during the third month.

First class: 1. Medical emergencies—Symptoms, diagnosis, general rules for emergencies, common causes of unconsciousness, poisons. 2. Demonstrations and practical instruction in the treatment of sunstroke, burns, heat exhaustion, severe hemorrhage, smothering, foreign bodies, shock, wounds of all regions, fracture dressing, use of packet. 3. The use of the field equipment—Pouches, cases, chests, furniture. 4. Practical field work.

Second class: Recitations—Asepsis and antisepsis, shock, bruises, burns, freezing, hemorrhage, the first-aid packet, wounds and their treatment, sprains, extraction of teeth, fractures, dislocations.

Materia medica and pharmacy (third and fourth months).—Instruction in this course is given in a lecture room in which a complete dispensary has been fitted up. Some time is spent in teaching the use of apparatus, the appearance of crude drugs, salts, and official preparations.

In each class of about 25 men there have been 3 or 4 who, because of deficient education or intelligence, were unable to profit by the instruction given in this course. Such men are usually dropped at the end of the first week. A few others find the subject difficult to understand, become discouraged, and fall behind. They are encouraged to do the best they can, and they usually finish the course with a proficient mark or approximating proficiency.

The course is a thorough one, and with a few months' practical experience in a hospital dispensary aims to prepare on the subject a candidate for promotion to the grade of acting hospital steward.

The man who in other respects is qualified for the latter grade has no difficulty in comprehending the work of the course or in standing well in the examination at its completion.

MATERIA MEDICA (THIRD MONTH).

The instructor is a graduate pharmacist of considerable experience.

First week: 1. The medical supply table. 2. Classification of drugs on the medical supply table. 3, 4. Definitions. 5. Review.

Second week: 1. Oxygen, hydrogen, and water. 2. Acids (mineral). 3. Acids (organic). 4. Alkalies (potassium, sodium, lithium, ammonium). 5. Review.

Third week: 1. Magnesium, zinc, and iron. 2. Lead, copper, and silver. 3. Mercury. 4. Antimony, arsenic, and bismuth. 5. Review.

Fourth week: 1. Alkaloids. 2. Volatile oils. 3. Fixed oils and fats. 4. Animal products. 5. General review.

PHARMACY (THIRD MONTH).

First week: 1, 2. Metrology. 3, 4. Operations requiring heat. 5. Review.

Second week: 1, 2. Operations not requiring heat. 3. The United States Pharmacopœia, official preparations. 4. Aqueous solutions. 5. Review.

Third week: 1. Alcoholic solutions. 2. Percolation. 3. Oleaginous solutions. 4. Ethereal solutions. 5. Review.

Fourth week: 1, 2, 3. Solid preparations. 4. Formulæ. 5. Review.

PRACTICAL COURSE IN MATERIA MEDICA AND PHARMACY (FOURTH MONTH).

First week: 1. Care of a United States hospital dispensary. 2. Use of weights and measures. 3. Solution, simple, chemical, gaseous. 4. Operations requiring heat. 5. Review.

Second week: 1. Operations not requiring heat. 2. Percolation. 3, 4. Official liquid preparations. 5. Review.

Third week: 1, 2, 3, 4. Official liquid preparations. 5. Review.

Fourth week: 1. The prescription. 2. Incompatibility of drugs. 3, 4. Dispensing. 5. Review.

COURSE OF INSTRUCTION IN CLERICAL WORK.

Clerical work is taught by lectures, recitations, and the actual preparation of the different reports, returns, and records required to be made and kept at a post or field hospital. The course extends throught the third and fourth months.

The nature, objects, and methods of preparation of the following reports are explained to the class and copies of the reports are examined and criticised.

Daily reports.—1. Morning report. 2. Morning report of Hospital Corps detachment. 3. Detachment sick report. 4. Posting of register of patients. 5. Correspondence and current work.

Weekly reports.—1. Weekly report of detachment.

Trimonthly return.—1. Ration return of detachment and patients subsisted on the ration.

Monthly reports.—1. Report of completed cases. 2. Return of Hospital Corps and means of transportation. 3. Report of physical examination of recruits. 4. Statement hospital-fund account. 5. Statement ice-fund account (at posts having ice factory). 6. Personal report of medical officers. 7. Personal report and post-office addresses of staff officers (G. O., 108, 1898). 8. Sanitary report. 9. Report of repairs of hospitals and hospital stewards' quarters. 10. Ration return for those rationed separately, requisition for fuel, forage, etc. 11. Pay rolls.

Bimonthly reports.—1. Muster rolls. 2. (Report of changes in detachment for preceding two months, rendered on the last day of each month the muster roll is not made out.)

Quarterly reports.—1. Ordnance return. 2. Return of clothing and general equipment (quartermaster), general hospitals only.

Yearly reports and returns.—1. Return of medical property. 2. Estimate of repairs to hospitals and hospital stewards' quarters. 3. Annual requisition for medical supplies.

Occasional reports and returns.—1. Report of epidemic diseases. 2. Report of record books. 3. Report of deaths and interments. 4. Report of change of status, Hospital Corps. 5. Inventory and inspection reports. 6. Report of sales at public auction. 7. Report of change of combination of office safe. 8. Special requisitions, invoices, and receipts, etc.

Instruction in care of animals (third and fourth months) is given at the stable. The members of the class are taught the uses of the horse equipment, to mount and dismount with and without saddle, to harness horses, to hitch them to the ambulance, etc.

There has not been opportunity to teach ambulance driving to the extent of making each man a competent driver.

CARE OF ANIMALS (THIRD AND FOURTH MONTHS, THREE TIMES A WEEK).

1. Grooming. 2. Handling. 3. Feeding. 4. Watering. 5. Care after exercise. 6. The halter. 7. Watering bridle. 8. Curb bridle. 9. Saddle. 10. Saddle blanket. 11. To mount without saddle. 12. Position of the trooper without saddle and with saddle. 13. Holding the reins. 14. To dismount without saddle. 15. To harness horses and to hitch to the ambulance. 16. Ambulance driving.

III. RECORDS OF INSTRUCTION.

Each instructor keeps in a class book a list of the members of the class from which he calls the roll. After a recitation or drill he enters in the class book the comparative standing of each man during the hour. At the end of each week the instructor turns in to the company office the relative marks of the members of his class during the week, where they are entered in the records and placed before the company commander for his information.

At the end of each month the weekly class standings are consolidated, the members of each class are graded, and the results published, with the markings attained in each subject.

FIRST MONTH.

Setting-up drill, daily, one-half hour.
Marching and bearer drill, daily, two and one-half hours.
Anatomy and physiology, daily, one hour.
Elementary hygiene, daily, one hour.
Bandaging, daily, one hour.
Articles of War (first week), Saturday, one hour.

Hours outside drill	3
Hours inside instruction	3
Total number of hours daily for five days	6

SECOND MONTH.

Setting-up drill, daily, one-half hour.
Marching and bearer drill, daily, two and one-half hours.
Ambulance drill, tent pitching, first aid, daily, one hour.
Emergency cooking, daily, one hour.
Diets for the sick, daily, one hour.
Nursing and ward management (practical), daily, one hour.

Hours, outside drill	3
Hours, inside instruction	3
Total number of hours, daily, for five days	6

THIRD MONTH.

Setting-up drill, daily, one-half hour.
Bearer drill and field work, daily, one hour.
Company drill, daily, one-half hour.
First aid, daily, one hour.
Elementary pharmacy, daily, one hour.
Materia medica, daily, one hour.
Clerical work, twice a week, one hour.
Care of animals, twice a week, one hour.

Hours, outside drill	2
Hours, inside instruction	4
Total number of hours, daily	6

FOURTH MONTH.

Calisthenics, one-half hour, daily.
Company drill, one-half hour, daily.
Bearer drill, one hour, daily.
Care of animals, one hour, twice a week.
Materia medica, one hour, daily.
Pharmacy, one hour, daily.
Clerical work, one hour, daily.

NONCOMMISSIONED OFFICERS' CLASS.

This class has been divided into two sections, one consisting of privates who are candidates for promotion to the grade of acting hospital steward, and the other section including the noncommissioned officers of the company.

The instruction of the candidates' class includes the following subjects:

Clerical work.—Practical instruction.

Mess management.—Practical instruction in the company mess.

Army regulations.—Recitations.

Drill regulations.—Hospital Corps. Recitations.

The course of instruction in the noncommissioned officers' section has included:

Drill regulations.—Hospital Corps and Infantry as far as they relate to the course of instruction in company drill. Recitations.

Army regulations.—Recitations.

IV. METHODS OF IMPARTING DISCIPLINE.

1. The standard of discipline in the company or the detachment should be equal to that maintained in any arm of the service. With the class of recruits which have been received here during the past six months such a standard may be exceeded. The methods of maintaining discipline should, of course, be the same as those of the line of the Army.

2. A most useful incentive to this end is to encourage in the men a feeling of pride in their corps, to guard its honor and reputation at all times, teaching them that delinquencies of anyone reflect on the entire organization and on each member of it, and consequently that it is the duty of each man to aid in bringing offenders to justice. An esprit de corps thus established has caused privates to report their comrades for untidiness and boisterous conduct while on pass, for appearing in public places with women of doubtful character, etc. For the establishment of this feeling the influence of noncommissioned officers is most important, and it is through it that the result is to be obtained.

"The greater the individuality you give to the soldier himself and to his company * * * the more he feels that his individual conduct is of importance."

3. It, of course, is understood that a satisfactory state of discipline can only be imparted by inspiring the men's respect and confidence in their officers, the result of conscientious and painstaking interest in everything that concerns a soldier's welfare.

"In an army the bestowal of praise is the greatest of all moral terms." A knowledge that the duty a soldier performs is observed by his officers, and that duty of any character conscientiously performed and meriting approval will receive it, has never failed to stimulate men in their efforts to accomplish the highest results.

4. For minor breaches of discipline several methods of punishment have been in use in this company. For a first offense it has been customary to inflict no punishment, but the man has been admonished and made to understand the position he has placed himself in, the danger he is taking of permanently injuring his record, etc. An appeal to the man's reason and sense of honor has seldom failed of good result. Confinement to quarters, denial of pass privileges, and extra (squad) drill have been the usual minor punishments. When summary court-martial trials have been necessary, the sentence of confinement has been avoided in cases where there had been no previous convictions.

The discharge, without honor, of three incorrigible and disreputable privates of the company had a most gratifying effect on discipline, and at the same time relieved the organization of its only troublesome members, whose bad conduct had reflected on all.

5. The influence of class standing and the rivalries it has created has had a beneficial effect in stimulating effort and encouraging all to do their best. Promotion has been largely dependent upon a man's class record. The improvised grade of lance acting steward has been utilized in rewarding excellence in studies and conduct, the appointment having been given before the man was qualified for examination for promotion.

V. PRACTICAL INSTRUCTION IN THE HOSPITAL.

I would suggest the following plan:

After the Hospital Corps recruit has completed his four months' course of instruction in the company he is transferred for "special duty" in a general or a large post hospital, to which is attached the company of instruction. The men on duty in the hospital are divided into the "permanent" and "temporary" forces.

1. The permanent force, consisting of noncommissioned officers and instructed privates who by reason of experience and other qualifications, are in charge of the various departments or subdivisions of the hospital organization. The permanent force should constitute about one-third of the hospital personnel, and each man should ordinarily retain the same duties at least three months. Also, in order not to cause confusion by interfering with the hospital routine, changes should affect but a part of the force at one time. The members of the permanent force also constitute the instructors of the temporary force.

2. The temporary force consists of men transferred from the company to the hospital for instruction. The transfers are to take place monthly, the men being distributed throughout the hospital. Their service while in the hospital should be about as follows:

Two months in the medical wards, the second month as senior or head nurse, if practicable.
Two months in the surgical wards, including service in the operating and dressing rooms.
Two months in the dispensary, the last month to be spent as senior assistant, if practicable.
Two months in the kitchen, including service in the diet kitchen.
Two months in the office.
One month in the stables.
One month on police duty.

At the completion of this service a man will have served in all departments of the hospital, and if he is of average intelligence, of good character, and interested in his work he should be a well-instructed Hospital Corps man.

The consensus of opinion is that it takes two years to make a good cavalry soldier and one year to make a good infantryman. To make a trained sanitary soldier from the average recruit without previous experience in any of his duties I think that the period of fourteen months herein recommended is not unnecessarily long. It should be remembered that from the time he enters the hospital the man performs the usual duties of the men of his corps. His services increase in value as the extent of his instruction increases.

Men with previous experience in cooking, pharmacy, nursing, clerical work, or in the line of the Army may of course be advanced more rapidly. This also may be done in the case of men of unusual aptitude and intelligence who are candidates for promotion, but who have had no previous experience.

Ordinarily I would not recommend a candidate for promotion to the grade of acting hospital steward until he had completed four months in the company or its equivalent and had served at least two months in the hospital. If he was in his first enlistment and had had no previous experience in cooking, nursing, pharmacy, or clerical work I would not recommend his promotion until he had completed four months in the company and at least ten months in the hospital.

VI. CHARACTER AND EXTENT OF INSTRUCTION AFTER ASSIGNMENT TO POST HOSPITAL.

I would suggest that a plan of instruction be adopted at each post to extend over ten months of the year, the remaining two months being reserved for field service, practice marches, etc.

The instruction to be given for at least one hour daily (as required by existing regulations) in the following subjects:

1. Bearer drill, 40 hours (two months).
2. Fieldwork, including the use of the field equipment, 20 hours (one month).
3. Anatomy and physiology, 20 hours (one month).
4. First aid, 40 hours (two months).
5. Nursing, 40 hours (two months).
6. Elementary hygiene, 20 hours (one month).
7. Materia medica and pharmacy, 20 hours (one month).

As instruction in diet cooking, clerical work, and care of animals should be given while the men are on duty in the kitchen, the stables, and the office, these subjects are not considered in the schedule.

It would be well to have the "school year" end with the instruction in bearer drill and field work preparatory to the practice march with the troops of the post. Should the practice march be concluded within a month I would suggest that whenever practicable the hospital corps go into camp at the post, closing the post hospital and establishing a field hospital, where post sick are to be transferred and treated.

The number of subjects to be taught at one time will vary with the medical officer's experience. My experience has inclined me to think that the best results are obtained with two subjects taught on alternate days until they are concluded.

VII. CLASSES IN THE HOSPITAL CORPS.

To increase the efficiency of the Hospital Corps I have the honor to recommend the establishment of two grades among privates, with a separate rate of pay for each grade—first-class privates at $20 per month and second-class privates at $15 per month. The relative numbers of each class to be 3 of the first class to 2 of the second class. All privates to be enlisted in the second class and advancement to the first class to depend on special qualifications and fitness for the position, as in promotion to the grades of acting hospital steward and hospital steward, position in the first class to be dependent on continued good behavior and attentiveness to duty.

Privates of the first class to be qualified in one or more of the following lines of duty:

Pharmacy.
Nursing.
Cooking.
Clerical work (stenography).
Carpentry.
Blacksmithing.
Ambulance driving, etc.

Recruits with training in any of these lines could be advanced on showing fitness after a few weeks' trial. Others to be promoted to the first class as they become qualified therefor and as vacancies occur.

The advantages of such a classification are as follows:

(1) The increase in pay would more generally attract desirable men.

(2) Men with special qualifications but who for various reasons are not fitted for the grade of acting hospital steward would still receive increased pay and other emoluments. In short, the grade of first-class private would be a recognition of special qualifications.

The duties of hospital corps men are now so specialized that it is impracticable to attempt to make the average recruit competent to fill every position in a large hospital. Therefore let a man qualify in one line of work for which he has aptitude and liking.

Men not qualified for the first class to remain in the second class on duty as police, orderlies, stablemen, etc. The pay of the second-class private at $15 is more than that of a private of the line and would be ample compensation for the duties performed. At present the pay of all is alike, and the man capable only of manual work receives the same amount as a competent nurse, dispensary attendant, or stenographer.

(3) The cost of the Hospital Corps would not be increased by the change to tw classes as herein proposed.

The pay of 100 privates at $18 is		$1,80
The pay of 60 first-class privates at $20 would be	$1,200	
The pay of 40 second-class privates at $15 would be	600	
		1,80

VIII. COMPANY ORGANIZATION.

With a view to uniformity and as the most effective and satisfactory method o training hospital corps men, I would suggest that companies of instruction be attached to general or post hospitals having a capacity of 30 beds or more. All hospital corps men on duty at the post to belong to the company or companies, those on duty in the hospital to be considered as on "special duty." The number of men detached from the company for special duty in the hospital should not exceed one-third o the company. The maximum quota of a company having, say, 150 men, one company could ordinarily furnish for hospital duty the necessary detail for a hospital o 150 beds and have 100 men for company duty. At hospitals having a capacity o over 150 beds more than one company might be attached; for hospitals of, say, 160 to 300 beds, two companies; over 300 to 400 beds, three companies; over 400 to 600, four companies, etc.

Suppose, for example, there was attached to a 150-bed general hospital a company of instruction of 150 men. Fifty men would be on special duty in the hospital, one-third of whom (say, 17) constituting the permanent force and two-thirds (say, 33) making up the temporary force, or those under instruction. After a few months this hospital could turn out about 20 trained hospital corps men each month, including the necessary quota of noncommissioned officers—men who had had four months' instruction in the company and had passed through the different departments of the hospital—without in any way interfering with its most efficient and economical administration. Two or three such companies attached to large hospitals could supply the Army and could keep it supplied with uniformly trained hospital corps men, a result well worthy of consideration.

In time of war the uniform training of all recruits might be begun at once by organizing as many companies of instruction as were necessary and attaching them to base hospitals. Should the conditions necessitate the mobilization for field service with the least possible delay the recruits might be passed through the company, equipped, and sent to the field without hospital instruction. The length of the period of instruction in the company might also be reduced. Hospital training being least necessary in the personnel of ambulance companies and the regimental medical service, men without such training should preferably be supplied to these places and the men with hospital experience reserved for service at base or permanent hospitals and large field (division) hospitals.

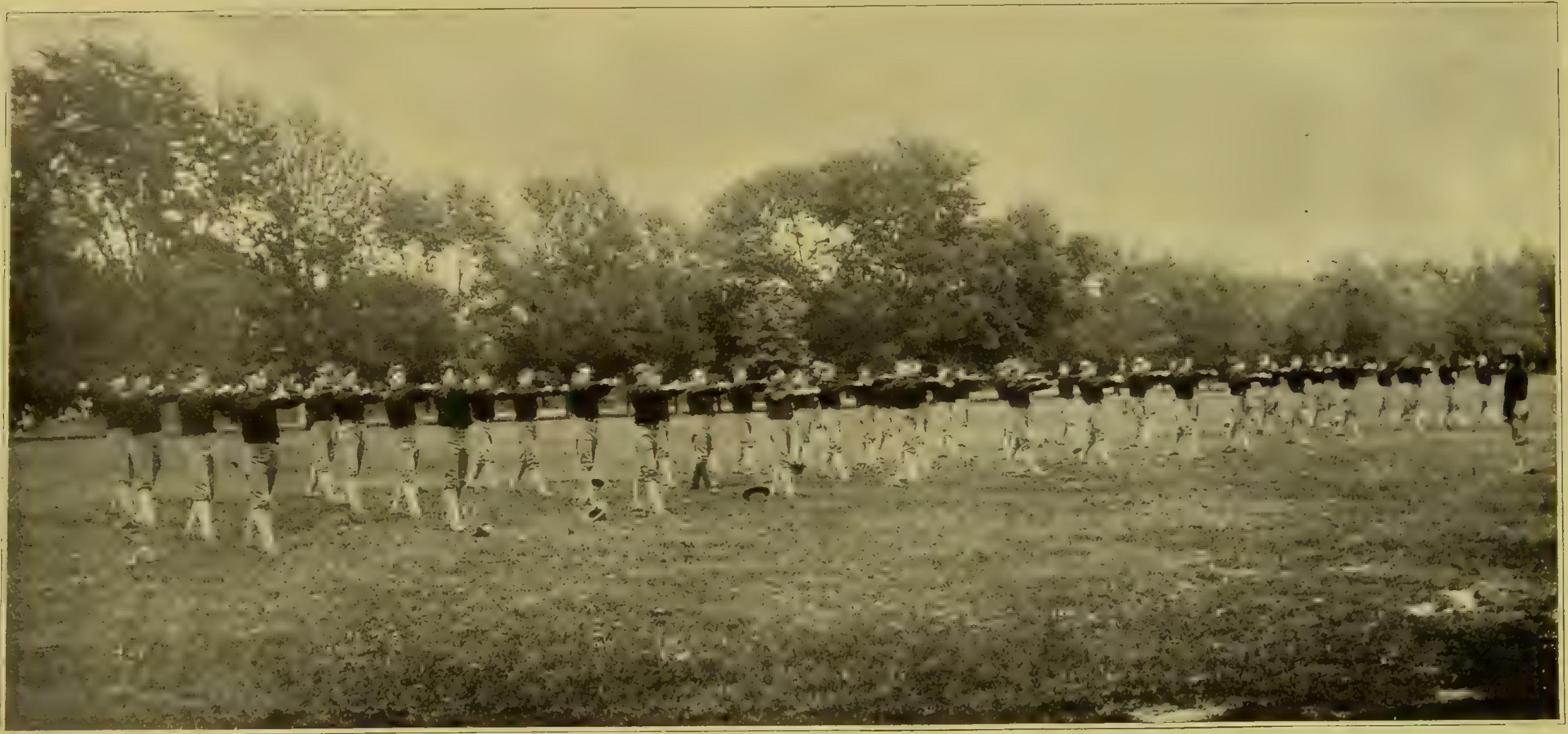
LIST OF CALLS FOR COMPANY OF INSTRUCTION, HOSPITAL CORPS, JUNE 30, 1901.

	A. M.
First call	5.30
Assembly	5.50
Calisthenic drill	6.00
Recall	6.30
Breakfast	6.30
Police	7.00
Company drill	7.45
Recall	8.15
Drill call	8.20
Assembly	8.30
Recall	9.30
School call	9.40
Assembly	9.50
Recall	10.50
Dinner	11.45

	P. M.
School call	1.45
Recall	2.45
School call	2.50
Assembly	3.00
Recall	4.00
Drill call	4.30
Recall	5.30
Supper	6.00
Sick call	5.45
Retreat, first call	6.20
Assembly	6.30

Saturday inspection.

First call	7.45 a. m.
Assembly	8.00 a. m.



CALISTHENIC EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS. D. C.. 1901.

PERSONAL EQUIPMENT OF A PRIVATE OF THE HOSPITAL CORPS.

Company of Instruction, United States Army,
General Hospital,
Washington Barracks, D. C.

1. Clothing list.

1 blanket.
1 blouse, complete.
1 forage cap.
2 cap ornaments.
2 pairs hospital corps insignia.
1 canvas coat.
2 summer coats.
6 collars.
4 pairs drawers.
4 undershirts.
6 pairs gloves, Berlin.
1 campaign hat.
1 campaign hat cord.
1 pair leggings.
1 overcoat (winter).
1 poncho.
2 muslin shirts.
2 blue shirts.
1 pair black shoes.
6 pairs socks.
1 pair blue trousers.
1 pair canvas trousers.
2 pairs summer trousers.
1 pair trouser stripes.
1 suit khaki (field uniform).
1 pair russet shoes.

2. Medical Department property.

1 hospital corps pouch.
1 litter sling.
1 Week's Nursing.
1 Smart's Handbook.
1 Doty's Prompt Aid.
1 Hospital Corps Drill Regulations.

3. Ordnance property.

1 canteen and strap.
1 haversack and strap.
1 waist belt and plate.
1 meat can.
1 tin cup.
1 knife, fork, and spoon.

4. Quartermaster's property.

1 shelter tent, half, poles, and pins.
1 barrack bag.
4 sheets.
2 pillow cases.

COMPANY REGULATIONS.

Company of Instruction, Hospital Corps,
Washington Barracks, D. C.

1. The following regulations will be observed for the maintenance of order and discipline in the company of instruction.

2. The orders of noncommissioned officers, when in the execution of their duties, shall be promptly obeyed without question or remark.

3. Whenever any member of this company thinks himself wronged by any order from a noncommissioned officer he may, after compliance with the order, report the fact to the commanding officer.

4. Noncommissioned officers shall be addressed, under all circumstances, by the title of their rank.

5. Smoking is strictly prohibited in the squad rooms between the hours of 8 a. m. and 5 p. m.

6. No indecent, profane language or boisterous behavior will be allowed in any part of the company barracks.

7. Lights in the squad rooms will be extinguished at 9 p. m. After that hour all talking and other noises in the squad rooms or talking or loitering on the porches is strictly prohibited.

8. There will be an inspection of quarters at 11 p. m. Those not on pass must be in their beds at that hour.

9. Citizen clothing will not be kept in the squad rooms. As soon as the uniform is obtained civilian clothing must either be disposed of or kept in the storeroom.

10. Citizen clothing will not be worn on pass unless special permission is obtained from the company commander.

11. Appearing outside the squad rooms in shirt sleeves or blouses unbuttoned is strictly prohibited.

12. The following uniforms are authorized from this date until further orders:

   1. Blue cap, blue blouse, and blue trousers; black shoes.
   2. Blue cap, blue blouse, and white trousers; tan shoes.
   3. White cap, white blouse, and white trousers; tan shoes. Barracks shoes will not be worn outside the quarters. The campaign hat may be worn in wet weather.

All enlisted men of the command who leave the garrison or hospital grounds will confine themselves to these uniforms.

13. The uniform for drill, inspections, fatigue, and field exercises will be prescribed by the commanding officer of the company of instruction.

14. The brown canvas suit will be worn on fatigue only.

15. No one will be allowed to enter the kitchen or dining room between meal hours except on duty.

16. Beds must be neatly made up before reveille. No one, unless on sick report, will lie on his bed before dinner.

17. Every member of this company shall take a bath and change his linen at least once a week.

18. Ball playing is prohibited on the United States Army General Hospital grounds.

19. Owing to the malarial conditions prevailing at this post, it is forbidden to loiter on the banks or lie or walk on the grass near the river after retreat.

20. No intoxicating liquors will be brought into the company squad rooms.

21. Application for passes must be made at 6 p. m. on the day before they are to go into effect.

LEAVING THE GARRISON.

Except on Saturdays, Sundays, and holidays, no private on duty with the company of instruction will be permitted to leave the garrison between reveille and retreat roll calls without the permission of the company commander or written permission from the noncommissioned officer of the company. In every case where such permission has been granted the man will report his departure and return to the company office.

DISPOSING OF CLOTHING.

Attention is called to the provisions of the seventeenth article of war, which prescribes the penalties for selling or otherwise disposing of articles of equipment or uniform clothing.

Hereafter, immediately after the weekly inspection, each member of this company will display on his bed, neatly arranged, all the articles of clothing issued to him by the Government, for inspection and verification by the noncommissioned officer in charge of his squad.

Any man found to be lacking an article of clothing which has been supplied to him by the Government will be reported at once.

PASSES.

The following is published relative to the granting of passes:

Special passes will not be granted except in cases of urgent necessity.

All passes will be from 6 p. m. to 11 p. m., with the exception of ten men daily, who will be allowed to be absent until 6 a. m. The men composing the permanent force on duty with the company will be allowed passes until 12 p. m.

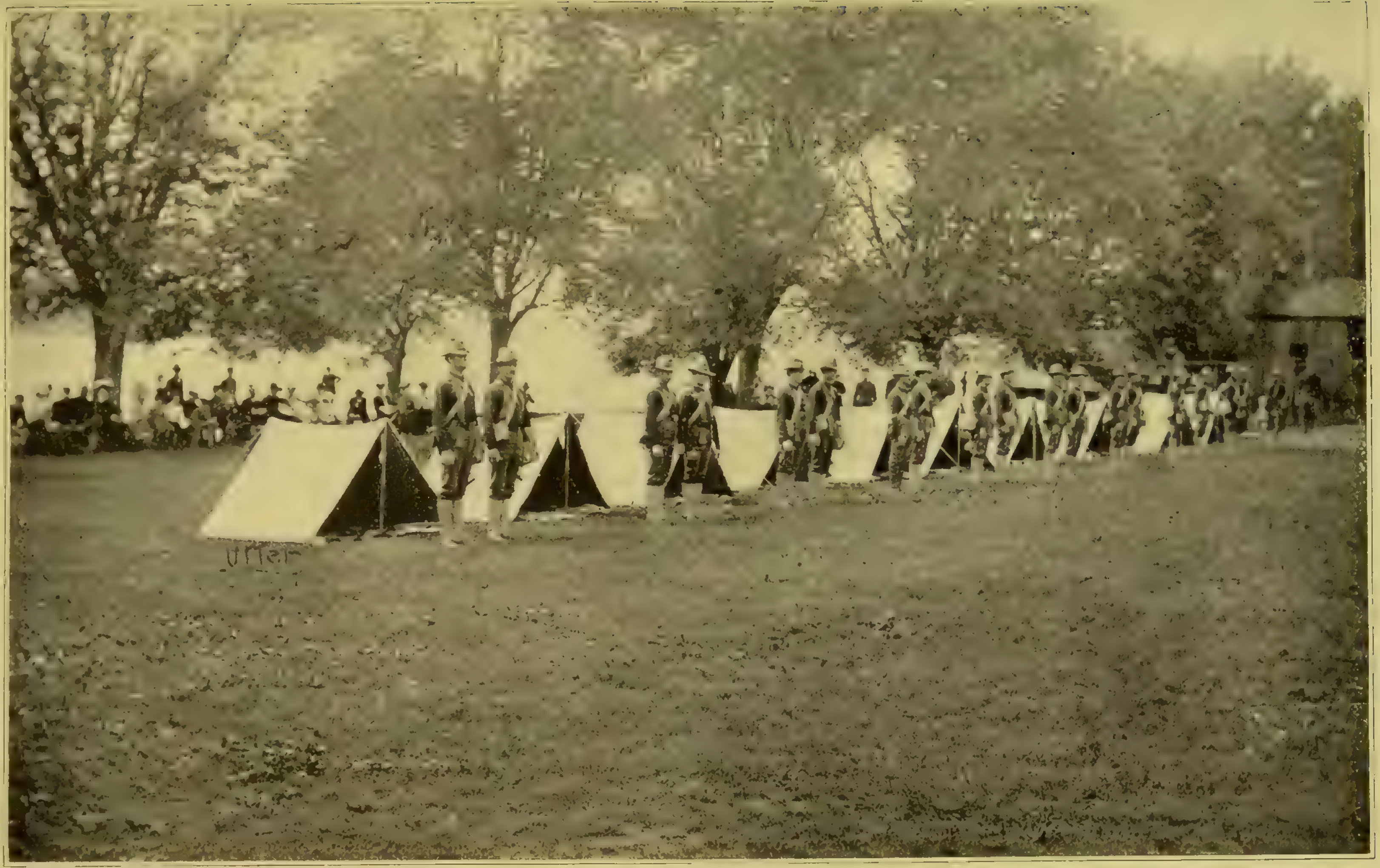
Uniform will be the dress for all. Special permission from the commanding officer must be obtained to wear civilian clothing while on pass.

All the men of this company are required to pay special attention to their personal appearance, their cleanliness and neatness, before leaving the post. Blouses and overcoats must be buttoned and kept so.

Passes for enlisted men of this command will be sent daily, at 6 p. m., to the gate guard, Washington Barracks, and will be sent for daily at guard mount. Enlisted men going on pass will report at the gate guardhouse their departure and return so that this date may be entered on the pass list.

Hereafter, and until further orders, the noncommissioned officer in charge of the gate guard at the time will require all members of the Hospital Corps coming in the gate between the hours of 11 p. m. and 6 a. m. to write their signatures on the pass list sent to the guard from this hospital.

In case of refusal the Hospital Corps man so refusing will be arrested and confined and report thereof made to the commanding officer, General Hospital, at 9 a. m. the following morning.



FIELD EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., MAY 28, 1901.

DUTIES OF NONCOMMISSIONED OFFICER IN CHARGE OF BARRACKS.

The noncommissioned officer in charge of barracks will be detailed daily by roster from noncommissioned officers on duty with the company.

He will go on duty at 9.15 a. m. and will be relieved by his successor at the same time on the following day.

He will report to the commanding officer of the company when going on duty and when relieved.

While on duty he will sleep in the guard room and between the hours of 9 a. m. and 6 p. m. will be habitually in the guard room, except when attending to his duties as herein prescribed.

His duties are as follows:

To take roll calls from noncommissioned officers in charge of squad rooms at taps and reveille.

To receive reports from the watchman and from noncommissioned officers in charge of squad rooms.

In case of fire to give the alarm and proceed as ordered in the fire regulations.

He will make an inspection of all quarters at 11 p. m., noting all absentees of the company not on pass and see that all unauthorized lights are extinguished.

Members of the company returning between the hours of 9 p. m. and 6 a. m. will report to him.

The watchman will be under his immediate orders and he will be responsible for the efficient performance of the latter's duties.

DUTIES OF WATCHMAN.

He will report for duty to the noncommissioned officer in charge of barracks daily at 9 p. m., at 11 p. m., and on being relieved at 6 a. m., and at other times when necessary.

During his tour of duty he is subject to the orders of the commanding officer of the hospital, the commanding officer of the company, and the noncommissioned officer in charge of barracks.

He will patrol the grounds of the post at least every three hours.

He will constantly be on the alert for fires, lights, and unauthorized persons in the post, immediately reporting all unusual occurrences and violations of existing orders which come under his observation to the noncommissioned officer in charge of barracks.

REPORTS OF NONCOMMISSIONED OFFICERS.

Hereafter all noncommissioned officers will report for instructions at the company office at 8 a. m. They will report the status of the work and the immediate needs of the departments of which they are in charge, and instructors will also report the subjects of instruction in each class during the day. Suggestions relating to their departments and also to the welfare of the company are requested and should be made at this time.

The school at Fort McDowell, Angel Island, Cal., under command of Capt. William H. Wilson, assistant surgeon, United States Army, may be considered as a receiving and distributing depot rather than an educational institution. Through it for the most part the Division of the Philippines was supplied, each transport carrying besides the permanent detachment for duty aboard a greater or less number of men of the Hospital Corps for duty in Hawaii and Manila. Ninety-two men were sent from this station in August and 150 in September, 1900, part of whom went to China for duty with the relief expedition. This station was also used as a depot for men of the corps returned from the Philippines to the United States for various reasons, excepting those sent for treatment who went to the general hospital at the Presidio. The former were distributed to posts in the United States nearest their places of enlistment for duty, or for the restoration of their health after a tour of duty in the tropics, and were replaced by men recently enlisted and awaiting transportation to the Philippine Islands. The methods obtaining at this school may be learned from the following report:

SCHOOL OF INSTRUCTION,
Fort McDowell, Cal., December 31, 1900.

SIR: I have the honor to submit the following report covering the year 1900 at this school.

During this time there have come and gone the following:

Enlisted men at school January 1, 1900	46
Female contract nurse (as dietist)	1
Gained by transfer	1,105
Gained by enlistment	3
Total	1,155
Lost during the year:	
By transfer to the Philippines	780
By transfer to Honolulu	6
By transfer to China	1
By transfer to hospitals in United States	240
By transfer to Signal Corps	1
Discharged	20
Deserted	9
By transfer to United States Army transports	28
Total	1,085
Enlisted men remaining at school December 31, 1900	69
Female contract nurse (as dietist)	1
Total	70

The course of instruction was necessarily made short, owing to the great demand for men in our foreign possessions, and I arranged it to cover a period of four weeks and a daily instruction of six hours, so that those who properly applied themselves could not help gathering some knowledge of their duties.

The instruction consisted in first carefully giving them a knowledge of each of the regulations that affects them as soldiers of the Army and the importance of maintaining military discipline. This is taught by lectures, reading of Articles of War and Regulations frequently, and punishments of every infraction of discipline.

Lectures are given daily, both demonstrated and illustrated, on anatomy and physiology to a moderate degree, nursing, first aid, and minor surgery.

An hour each day is devoted to practical work, which includes bandaging, applying the first-aid packet to all parts of the body, taking and recording of temperatures, artificial respiration and resuscitation.

One hour a day is given to drill, litter-bearer drill, and the different methods of carrying a wounded man and applying temporary dressing on the field. Setting-up drill is given for half an hour each morning to straighten up the new recruits and limber up any stiff joints for the work of the day.

For the cooking, the classes are divided into four sections of about ten men each in order that each man may have practice in preparing each article of diet as he is directed to. This department is under the immediate superintendence of Miss Stoker, a contract nurse, and she performs her work with great satisfaction to all concerned.

Another feature of the instruction which was omitted from my last report is that given in office work and the preparation of the official papers. Many men have left this school able and efficient clerks who knew but little about these matters when they first entered the office.

It will be noted that during the year but two privates reached the grade of acting hospital steward while at this school, for the reason that only those were recommended to take the examination who were fully qualified, and these two, it can be said to their credit, passed a very creditable examination.

The grade of lance acting steward is given to men who have shown ability and aptitude to take charge of squad rooms or assist at drills or classes, and while acting as such they wear the chevron of a corporal, but this grade does not follow them after leaving this school.

Before closing this report, I wish to invite attention to the great assistance rendered me by Hospital Steward Michael Leahy. He is thorough, careful, and conscientious in the discharge of all his duties, and controls the men under him at this school, many of whom are recruits, in an excellent and soldierly manner.

Very respectfully,

William H. Wilson,
Captain and Assistant Surgeon, U. S. A.,
Commanding School of Instruction.

Schedule of instruction, Fort McDowell.

Hours.	Monday.	Tuesday.	Wednesday.
A. M.			
7.10–7.40	Setting-up drill	Setting-up drill	Setting-up drill.
8–8.45	Study	Study	Study.
9–10	Section A. Cooking, litter drill.	Section D. Cooking, litter drill.	Cooking, review.
10.15–11.15	Lecture	Lecture	Lecture.
P. M.			
1.30–2.30	Section B. Cooking, bandaging, and practice work.	Section A. Cooking, bandaging, and practice work.	Fatigue.
2.20–3.30	Section C. Cooking, study.	Section B. Cooking, study.	Do.

Hours.	Thursday.	Friday.	Saturday.
A. M.			
7.10–7.40	Setting-up drill	Setting-up drill	
8–8.45	Study	Study	
9–10	Section C. Cooking, litter drill.	Section B. Cooking, litter drill.	Inspection.
10.15–11.15	Lecture	Lecture	Articles of war.
P. M.			
1.30–2.30	Section D. Cooking, bandaging, and practice work.	Section C. Cooking, bandaging, and practice work.	
2.30–3.30	Section A. Cooking, study.	Section D. Cooking, study.	

The company of instruction at Manila was principally used for the instruction of men newly arrived from the United States who were so hastily recruited that no opportunity for training or discipline had been afforded. It was also used as a depot of assembly and distribution, as will be learned from the following report by Capt. John S. Kulp, assistant surgeon, United States Army, dated June 18, 1900:

A Hospital Corps company of instruction had been needed in this division ever since the American occupation, but owing to the dearth of medical officers and Hospital Corps men, as well as to other obstacles, it was not practicable until January, 1900, to obtain a sufficient number for systematic instruction. With this object in view the following letter was written, under the caption "Proposed increase in capacity for sick:"

Supplementary Wards,
Manila, January 1, 1900.

The Chief Surgeon Department Pacific and Eighth Army Corps.

Sir: I have the honor to make the following recommendations in regard to the increase of the number of beds available for the sick, and the more systematic instruction of the men of the Hospital Corps:

The number of men casually at the First Reserve and other hospitals can be assembled in one place and regularly instructed in the various duties of the sanitary soldier, thus allowing the place which they now occupy to be given over to the sick, and also providing a number of well-instructed men for the various and constant demands made for them.

A suitable place is found in the abandoned magazine and its fortification adjoining this hospital. It could be made habitable by the following changes: (*a*) The removal of the present foot bridge, which is unsafe, and its change to a more suitable location; (*b*) the cutting of five windows in the magazine and the addition of a door, thus fitting it for officers' quarters; (*c*) the thorough cleaning of the whole inclosure.

For a company of instruction, varying between 40 and 100 men, the following administrative personnel would be required: One medical officer, 4 noncommissioned officers, and 1 private. For their subsistence at this hospital, an additional force of 4 privates.

JOHN S. KULP,
Captain, Assistant Surgeon, U. S. A.

[First indorsement.]

Respectfully forwarded to division headquarters, approved and recommended. If this plan be carried out, 75 beds in the First Reserve Hospital, that are now occupied by Hospital Corps men on duty there, together with the casuals belonging to the corps, who are constantly arriving from the United States, can be placed under conditions where they can be disciplined, properly handled, and instructed in their duties. The expense appears to be trifling, and the personnel can be taken principally from men now at the hospital.

CHARLES R. GREENLEAF,
Colonel, Assistant Surgeon-General, U. S. A., Chief Surgeon.

[Fourth indorsement.]

Respectfully forwarded to the adjutant-general of the division, recommending approval, the allotment, etc.

C. P. MILLER,
Major and Quartermaster, U. S. A., Chief Quartermaster.

[Fifth indorsement.]

Respectfully returned to the Chief Quartermaster, approved as indicated in the fourth indorsement.

By command of Major-General Otis:

THOS. H. BARRY,
Assistant Adjutant-General.

This request being granted, 14 men were transferred by the middle of January, and although they were not the most efficient and soldierly men of the corps, they formed a nucleus, and others of a better class were obtained by transfer from the line and also from various detachments. At first the discouragements were many, and the final success of the organization is principally due to the constant supervision and assistance rendered by the chief surgeon.

Location.—The place selected is the Redan San Carlos, a part of original fortifications, which date back to 1591. They were remodeled in 1604, 1691, and again in 1762, and are in an admirable state of preservation. It is very questionable whether artillery was ever mounted in this particular fortification, although it is practically impregnable to unsupported infantry. The foliage-covered walls inclosed a space filled with rank vegetation and small trees, the center of which was the massive stone magazine. With the exception of the gun emplacements, which are of Chinese granite, the masonry is of the same Roman cement blocks as is used on the walls of the city. The labor of cleaning out was interrupted by the finding of three pythons, the largest of which was over 11 feet in length. These, together with monkeys, wild bees, centipedes, lizards, and enormous spiders, have been the only inhabitants for many years.

The guard and lecture tents are on the walls, which range from 18 to 45 feet in thickness, while 18 hospital tents in the gun emplacements furnish quarters. Each is framed and floored over the granite, and a 6-inch terra-cotta pipe running through the wall affords excellent drainage for each. At high tide the moat surrounding the redan is filled with 6 feet of water, beneath which is mud of unexplorable depth. The moat is kept free of vegetation in order not to obstruct the flow of water, and the camp has been remarkably healthy.

Sea bathing is convenient, but most of the men prefer the baths of hospital No. 3, which are easily accessible.

In order to place the company upon a sounder official footing, the following order was issued on the recommendation of the company commander:

[General Orders, No. 23.] MANILA, P. I., *May 23, 1901.*

In view of the necessity for properly instructing small detachments of the Hospital Corps, and because of the number of untrained men constantly reporting for duty, a Hospital Corps company of instruction is hereby established, to be located in the city of Manila.

1. The personnel of said company will consist of 2 medical officers, 1 hospital steward, 3 acting hospital stewards, 2 Hospital Corps privates, in addition to 60 men under instruction.

2. The curriculum will consist of such practical and theoretical instruction as may be necessary to insure proficiency in all the duties of the sanitary soldier, and will extend over a period of fourteen weeks. The faculty of the school will consist of its commanding officer and such other instructors as the chief surgeon may designate from among the medical officers serving in Manila.

3. At the completion of the course those passing satisfactory examinations will receive the certificate of the school; those passing special qualifications will be recommended for promotion to the grade of acting hospital steward.

4. The discipline and internal administration of the school will conform to that of a company of infantry.

5. The chief surgeon of the division is authorized to take such measures as will result in the transfer of men to and from the company, as may be indicated by the needs of the service.

By command of Major-General MacArthur:

M. Barber,
Assistant Adjutant-General.

The periods of instruction are as follows:

Hour.	Monday.	Tuesday.	Wednesday.
A. M.			
7.15–8.15	Drill	Drill	Drill.
9.40–11	Study hour	Study hour	Study hour or signal drill.
11–12	Pharmacy	Minor surgery	First aid.
P. M.			
3–4	First aid	Elementary anatomy and physiology.	Do.
4–5.25	Study hour	Study hour	Study hour.

Hour.	Thursday.	Friday.	Saturday.
A. M.			
7.15–8.15	Drill	Drill.	
9.40–11	Study hour	Study hour	Inspection (10 a. m.).
11–12	Regulations and discipline.	Nursing	Drill.
P. M.			
3–4	Clerical work	First aid.	
4–5.25	Signal drill	Study hour.	

While receiving practical instruction in wards men will attend all lectures; while receiving practical instruction in cooking men will attend afternoon lectures; while receiving practical instruction in diet cooking men will attend all lectures.

The course covers between sixteen and eighteen weeks and consists of 105 periods of theoretical and one hundred and twenty hours of practical instruction. In addition, each man is detailed for seven days in a hospital ward under the instruction of its surgeon. During this time he is taught the practical routine work of the ward, the actual contact with patients, methods of treatment, and administration of medicines, all of which are considered indispensable.

Cooking can not be taught theoretically with success, even from such excellent aids as the Manual for Army Cooks and Munson's Emergency Diet for the Sick. Every man is put in the main kitchen of Hospital No. 3 and is taught the actual cooking by the second cook there. No more than two men are under instruction at any one time and the minimum period is five days. Those showing real aptitude are then given additional instruction in this branch. After serving in the main kitchen the recruit receives three days of training in that for light diet. Here, where over 300 meals are prepared daily, he acts as assistant to the second cook and is taught the tasteful serving and the preparation of a few standard delicacies rather than an imperfect smattering of the whole subject. But one man is under instruction at a time in this place.

Of the practical instruction the cultivation of upright and soldierly habits and the inculcation of thorough discipline are considered of great importance because of the peculiarly grave duties of the Hospital Corps private, especially in detached commands, where the trustworthiness of the sanitary soldier becomes a matter of life or death. The daily drill in marching, the manual of the loaded litter and travois, is made sharp and progressive. Fieldwork in handling patients, applying dressings, and surmounting obstacles is taught on three afternoons a week throughout the whole course, while each member of the class is given enough of signal drill to enable him to use this system of communication in emergencies.

A synopsis of the theoretical instruction is as follows, each course consisting of lectures, demonstrations, and recitations:

PHARMACY (MONDAY, 11–12 A. M.; LIEUTENANT MILLHOFF, INSTRUCTOR).

Lecture 1.—The weights and measures, their origin and bases, relation to each other, with especial regard to the metric system.

Lecture 2.—The abbreviations and terms of pharmacy.

Lecture 3.—Simple definitions of the preparations. The tincture, fluid extract, extract, pill, ointment, etc.

Lecture 4.—The operations of pharmacy, filtering, etc.

Lecture 5.—Practical points on dispensary work, cleanliness, systematic arrangements, care of scales, etc., dispensing, with especial reference to poisons.

Lecture 6.—The ingredients and doses of some of the simpler remedies such as seidlitz and Dover's powders, compound cathartic pills, etc.

Lecture 7.—The alkaloids in general, their sources, formation, and doses of their salts.

Lecture 8.—The alkaloids in most common use, morphine, quinine, etc.

Lecture 9.—Opium, source, doses, and strength of preparations.

Lecture 10.—Mercurial preparations, arsenic, and iron.

Lecture 11.—The general classification of drugs according to their physiological action, stimulants, depressants, etc.

Lecture 12.—The various antidotes to poisons.

Lecture 13.—General instruction on the subject-matter of the first seven lectures.

Lecture 14.—The same on the remaining lectures. Questions by the class.

Lecture 15.—General review, prescription reading.

MINOR SURGERY (TUESDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON A. W. WILLIAMS, INSTRUCTOR).

Lecture 1.—Informal talk on surgical procedures in general, cleanliness, preparation of the operating room, hands, instruments, dressings, etc.

Lecture 2.—The preparation of the patient for an operation where a general anæsthetic is required. Field of operation.

Lecture 3.—Anæsthetics, general and local. Their indications.

Lecture 4.—Administration of a general anæsthetic. Contra-indications.

Lecture 5.—Care of patients after operation.

Lecture 6.—Wounds, their varieties, causes, and treatment.

Lecture 7.—The healing of wounds.

Lecture 8.—Hemorrhage, varieties, causes, and treatment.

Lecture 9.—Ulcers and abscesses, causes, varieties, and treatment.

Lecture 10.—Sprains and bruises.

Lecture 11.—Dislocations, with special reference to diagnosis.

Lecture 12.—Fractures in general, special fractures, splinting.

Lecture 13.—Minor amputations, gangrene.

Lecture 14.—The anatomy, care, diseases, and extraction of teeth.

Lecture 15.—General review.

ELEMENTARY ANATOMY AND PHYSIOLOGY (TUESDAYS, 3–4, P. M.; MAJOR KULP).

Lecture 1.—(Text-book, Pilcher.) The human machine; what is meant by energy, life, and the lower forms of life.

Lecture 2.—The cell, varieties, life history, specialization.

Lecture 3.—The skin and its functions.

Lecture 4.—The fat and its uses.

Lecture 5.—Review.

Lecture 6.—The bones and the joints.

Lecture 7.—The nervous system.

Lecture 8.—The blood and its circulation.

Lecture 9.—The arteries.
Lecture 10.—Review.
Lecture 11.—The apparatus and mechanics of respiration.
Lecture 12.—Digestion.
Lecture 13.—The viscera.
Lecture 14.—The special senses.
Lecture 15.—Review.
Lecture 16.—Physiology as a whole.
Lecture 17.—Microorganisms.
Lecture 18.—Infection and its prevention.
Lecture 19.—General field hygiene.
Lecture 20.—Review.

FIRST AID (WEDNESDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON VAN METER, INSTRUCTOR).

Lecture 1.—Outline of the subject and scope of its operation.

Lecture 2.—Gross topography of the body; explanation of the more simple technical expressions.

Lecture 3.—The vulnerable parts of the body.
Lecture 4.—Bandages and dressings, with special reference to fractures.
Lecture 5.—Classification of various first-aid dressings and their applications.
Lecture 6.—The wounds and injuries of the battlefield.
Lecture 7.—The application of first-aid dressing to wounds.
Lecture 8.—Hemorrhage in detail.
Lecture 9.—Specific hemorrhage, in regard to treatment.
Lecture 10.—The emergency treatment of unconsciousness in general.
Lecture 11.—Asphyxia, suffocation, poisons.
Lecture 12.—Emergencies in general.
Lecture 13.—General review of first half of course.
Lecture 14.—General review of remainder of course.
Lecture 15.—Quiz and questions by the class.

REGULATIONS, ALLOWANCES, AND DISCIPLINE (THURSDAYS, 11–12 A. M.; HOSPITAL STEWARD HARTFORD, INSTRUCTOR).

Lecture 1.—The Army Regulations and Articles of War, with special reference to those affecting the Hospital Corps soldier in his relations to other branches of the service.

Lecture 2.—Continuation of the same subject.

Lecture 3.—The duties of an orderly in detail. How to transmit and receive messages; how to address superiors; the various ranks and their insignia.

Lecture 4.—Changing station. The proper course for an order. The ration, transportation, arrival, and reporting.

Lecture 5.—Records, and why they are necessary. A general discussion of how to take charge of the papers of a detached command.

Lecture 6.—Morning report of Hospital Corps detachment. Report of sick and wounded, and special reports to brigade and division headquarters.

Lecture 7.—Inventory and classification of property.

Lecture 8.—Want list. List of condemned property. Requisitions, annual, special, emergency, etc. Invoices and receipts. Clearances.

Lecture 9.—Management of the various kinds of property. Memorandum receipts.

Lecture 10.—The ration return, and the accumulation and use of the savings thereof. Fuel, forage, and illuminating supplies.

Lecture 11.—Official letter writing, briefing, and indorsing.
Lecture 12.—Descriptive lists, clothing accounts, and schedules.
Lecture 13.—Discharge and final statements.
Lecture 14.—The routine monthly reports.
Lecture 15.—General monthly review.

CLERICAL WORK (THURSDAYS, 3–4 P. M.; HOSPITAL STEWARD ARMSTRONG, INSTRUCTOR).

Lecture 1.—Necessity and advantage of neatness and accuracy.
Lecture 2.—The ration return. Commutation and savings of ration.
Lecture 3.—Clothing, how obtained, stored, issued, and accounted for.

Lecture 4.—The property responsibility of enlisted men, with special reference to the Hospital Corps.

Lecture 5.—Medical property, how obtained, to whom issued, how and to whom accounted for. Lost property.

Lecture 6.—Quartermaster property in the same detail.

Lecture 7.—Ordnance property in the same detail.

Lecture 8.—Register of patients and report of sick and wounded.

Lecture 9.—Briefing and indorsing official correspondence.

Lecture 10.—Muster and pay rolls, descriptive lists, Hospital Corps returns, and recruiting papers.

Lecture 11.—Proceedings of boards of survey and courts-martial.

Lecture 12.—Discharge for disability. The preparation of discharge certificates and final statements.

Lectures 13, 14, 15.—A quiz by the instructor in relation to the subject-matter of the preceding lectures, and responses to questions by the class.

NURSING, HYGIENE, AND WARD MANAGEMENT (FRIDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON W. J. LYSTER, INSTRUCTOR).

Lecture 1.—(Text-book, Weeks.) The ward duties of a nurse. Cleanliness, order, economy, system, noise, etc.

Lecture 2.—Beds, common, field, air, and water. Bedding and its care. Bed sores.

Lecture 3.—The pulse, temperature, respiration, ventilation.

Lecture 4.—Symptoms, attitude, expression, subjective and objective. The faculty of observation.

Lecture 5.—Medicines, their administration; prescription reading; names of common drugs.

Lecture 6.—How medicines act. Dosage.

Lecture 7.—Poisons.

Lecture 8.—External medication, counterirritants, rubefacients, vesicants, cupping, leeches, poultices, etc.

Lecture 9.—Enemata, injections, purgatives, baths, and massage.

Lecture 10.—Parasites, internal and external.

Lecture 11.—Infectious diseases and their prevention.

Lecture 12.—Surgical nursing, operations, hemorrhage.

Lecture 13.—Emergencies.

Lecture 14.—Hygiene in general.

Lecture 15.—The hygiene of the ward.

Lecture 16.—The management and discipline of the ward.

Lecture 17.—The records of a ward.

Lecture 18.—General review.

The examinations are both written and oral, and the certificate of the school is given only to those who are fitted for the special work of the Hospital Corps private. The final mark is based on (*a*) character and habits; (*b*) practical proficiency as reported by the first sergeant, ward masters, and cooks; (*c*) the written examination in each theoretical subject; and (*d*) the result of drill, field work, signal proficiency, and recitations. Of the last class of 43 there were 13 graduates.

The discipline and administration conforms to that of a company of infantry. The permanent personnel consists of a commanding officer, first sergeant, drill sergeant, quartermaster-sergeant, clerk, and bugler. The two latter are privates of the Hospital Corps, the acting sergeants being noncommissioned officers of the same.

The graduating exercises of the first class were held on the 15th of June, in the presence of the major-general commanding and the chief surgeon of the division. The following programme was carried out:

Selection, by Sixth Artillery Band.
Practical exercises with roller and triangular bandages.
Address to the graduates: Col. Charles R. Greenleaf, chief surgeon of the division, assistant surgeon-general United States Army.
Demonstrations by members of the class:
  (a) The blanket litter.
  (b) Humane restraint.
  (c) Artificial respiration; placing the patient in bed.
  (d) Lifting and carrying patients.
Awarding certificates, prizes, and chevrons: Maj. Gen. Arthur MacArthur, military governor of the Philippines.
Selection, by Sixth Artillery Band.
Exhibition drill.

It is believed that this company fulfills a useful purpose. That an esprit de corps of no mean grade already exists among its men was shown by an instant and unanimous answer to a call for volunteers to nurse plague patients, and the fact that one of the class (Private Archibald D. Wilson) remained on duty for hours with a delirious case of septicæmia after receiving what he supposed to be a fatal wound, and which indeed proved to be a badly infected one.

The first class was handicapped by an unavoidable delay in receiving its instruction books, and by an amount of fatigue work that somewhat justified the remark that the principal studies were digging ditches and carrying lumber; yet the progress of the class was fairly satisfactory. The next enters under much more favorable auspices.

Casual camp.—The casual camp is organized as a subpost to the company of instruction and is situated near it on the field of Bagumbayan.

Almost every transport bearing American troops to the Philippines brought enlisted men of the Hospital Corps as well, but until January, 1900, they were assigned to the detachment of the First Reserve Hospital and withdrawn as occasion required. Coincidentally with the establishment of the company of instruction, the camp was organized, and since that time its personnel has fluctuated between 10 and 220. The present number is 74.

The camp receives all recruits, men awaiting assignments, as well as those casually in Manila, and consists of a variable number of hospital tents floored and furnished with cots. The men mess at Hospital No. 3. Water for ordinary purposes is furnished by a hose line from the city mains and drinking water from the sterilizing plant at the hospital. The dry-earth system of pan closets is used.

When the recruit arrives he spells his name to the noncommissioned officer, who checks it and takes an inventory of his Government property, the result of which he records on the card index, affixing his initials. The recruits are then assigned to tents and given copies of the orders for camp.

All require light summer clothing, and this is issued as soon as is practicable. When it is realized that the monthly return of the Hospital Corps personnel usually contains four or five hundred names, the amount of clothing issued may be understood.

A record is taken of any special qualifications the recruit possesses, and his noncommissioned officers are interrogated concerning his efficiency, character, and habits. His name is now placed on the assignment list, and he is recommended for whatever vacancy he appears best qualified to fill. Those men not showing unmistakable evidence of recent and successful vaccination are revaccinated. In practice this amounts to nearly the whole number, and the success obtained proves the wisdom of the operation. It is believed that the notation, "successful," on the descriptive list applies equally well to vaccinia and streptococci infection.

The sick report of the camp is large, the principal causes of admission being venereal and tropical skin diseases, together with intestinal disturbances connected with excesses in a new climate. These recruits proved no exception to the general rules governing their class.

The records required of the camp are a morning report to the commanding officer, sick report, duty roster, card index of enlisted men, and record of special qualifications.

While awaiting assignment the men receive regular instruction in connection with the company, consisting of the daily morning drill and practical work of various kinds. Their stay in camp being of such uncertain length, renders it difficult to attempt really systematic instruction.

When the recruit is assigned to duty, the noncommissioned officer in charge of transportation procures it by boat, rail, or cart; the man is furnished with subsistence and given written directions regarding the place where he is to report. Just before leaving his property is again checked by the acting quartermaster-sergeant, and upon the result, noted on his card index slip, is based the invoice for the property as transferred to his new commanding officer. The descriptive list is invariably mailed within twenty-four hours. Up to this date 774 noncommissioned officers and privates have passed through the camp, and there has been no loss of man or property.

The success which followed the instruction given at these schools has been shown in the special reports, not alone of medical officers, but of many other officers.

Regimental field hospital.—About the last of February, 1901, I notified the Quartermaster-General of my purpose to assemble at certain posts so much of the material of a regimental field hospital (General Orders No. 178, November 8, 1898, from the Headquarters of the Army) as is furnished by the Medical Department, and suggested, in order that these hospitals may be thoroughly efficient and ready for immediate service, that the Quartermaster-General assemble the necessary camp equipage and transportation, if not already at the posts. The following posts were finally designated, viz:

Department of the East: Fort Columbus, New York Harbor; Plattsburg Barracks, N. Y.; Fort McPherson, Ga.
Department of the Lakes: Fort Sheridan, Ill.; Fort Thomas, Ky.
Department of Dakota: Fort Snelling, Minn.; Fort Meade, S. Dak.
Department of the Missouri: Fort Leavenworth, Kans.; Jefferson Barracks, Mo.
Department of Texas: Fort Sam Houston, Tex.; Fort Clark, Tex.
Department of the Colorado: Fort Logan, Colo.; Fort Douglas, Utah.
Department of the Columbia: Vancouver Barracks, Vancouver, Wash.

The object in the organization of two regimental field hospitals in each department is to have at hand for immediate use by the local military authorities a complete equipment sufficient for the medical needs of a considerable percentage of the command in emergency for active service, field maneuvers, instruction, etc. It is expected that these hospitals will be maintained in the best possible condition and always be in readiness for transfer to any point within the department.

A considerable number of reports have been received in response to a circular letter to chief surgeons, requesting them to ascertain the views of medical officers who may have had active service as to the transportation of the wounded, particularly in regard to details from the line of the Army for this purpose, and to their instruction under paragraph 1608, Army Regulations, 1901. The consensus of opinion seems to be: First, that details of litter bearers from the line have very generally been made; second, that such details were made by the company commander from any men conveniently at hand at the time of the emergency; third, that the work was fairly well done; fourth, that the detail of permanent company bearers is not deemed desirable, but that all men of the line should be so instructed as to be available for bearer work whenever required.

As to the instruction in first aid heretofore given by the company officers under the requirements of this paragraph (1608), it is regarded as being ineffective, and it is suggested that more attention be paid to that part of the regulations which requires the company officers to be thoroughly instructed.

The Hospital Corps is, in the very nature of its work, represented in every engagement; indeed, wherever there may be other soldiers, there, too, are men of this organization. I take pride in the fact that these men have borne themselves creditably under all conditions of service. The following have been especially commended since the date of the last report:[1]

Hospital Steward William A. McGuire.
Hospital Steward E. C. Baldwin.
Hospital Steward Michael Leahy.
Hospital Steward Herbert L. Kneisley, Forty-seventh Infantry, United States Volunteers.
Acting Hospital Steward John R. Kissinger.
Acting Hospital Steward Charles K. Metcalf.
Private Edgar Moore.
Private Ernest H. Stuckert.
Private F. E. White.
Private E. T. Hitch.
Private Louis Palsen.

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[1] It is possible that not all are mentioned in this list who are entitled to be, as copies of reports of this character are not invariably furnished this office.

Private Thomas Nielson.
Private John Huff.
Private Dallas Rector.
Private Ambrose L. Van Hise.
Private James N. Lothrop.
Private Clarence A. Chandler.
Private Michael Ilitz.
Private John B. Welsh.
Private Charles W. Abrams.
Private Archibald E. Wilson.
Private Walter H. Phelps.
Private Joseph Fuerst.

During the year the following-named members of the Hospital Corps were given commissions in the line of the Army:

John Jackson.
Edward Lee Raines.
Oliver F. Snyder.
Cleveland Hilson, jr.
Walter C. Jones.
Charles R. Mayo.

Commissions given since July 1, 1901:

Raymond S. Bamberger.
Kneeland S. Snow.

ARMY NURSE CORPS.

With the passage of the army reorganization bill the Nurse Corps became a part of the Medical Department. Provision was made for a Superintendent to be appointed by the Secretary of War, who, under the Surgeon-General, should have charge of the administrative work of the corps. Mrs. Dita H. Kinney was appointed March 15 to that position.

The new law made several other changes in the status of the corps: (1) The nurses no longer serve under contract, but are appointed and discharged by the Surgeon-General with the approval of the Secretary of War. (2) Their payment has passed from the Medical to the Pay Department of the United States Army. (3) The regulations governing admission to the corps are more rigid than formerly, and require candidates to pass satisfactorily certain prescribed mental, physical, moral, and professional examinations. Nurses must give four months' service in the United States to test practically their fitness for army work before they may be assigned to foreign duty. (4) The term of service has been increased from one year to three, the tour of foreign duty from one year to two.

The number of nurses who have applied for admission to Government service since early in 1898 is 7,780. Of these, 1,680 have been employed. The largest number serving at any one time was 1,200, in September, 1898.

The number of nurses in the Army Nurse Corps has decreased during the year. On July 1, 1900, there were in the service 210; on July 1, 1901, 176. Twenty-eight appointments were made during the year. Of these 13 had rendered previous satisfactory service, 15 were new. Sixty-two nurses have been discharged. Of these, 10 are doing civil nursing in the Philippines; 1 has accepted a teacher's position in a school in those islands; the others left the service for various reasons, such as family considerations, disability, etc.

The number of nurses employed in the United States remains practically the same as last year. On July 1, 1900, there were 60; on July 1, 1901, 59. Their distribution July 1, 1901, was as follows: United States Army General Hospital, Presidio of San Francisco, Cal., 43; Fort Sam Houston, Tex., 2; Fort Bayard, N. Mex., 8; Fort McDowell, Cal., 1; on waiting orders, 5.

The improved condition in Cuba has made only 5 nurses necessary there, distributed among three army hospitals, against 16 one year ago and 76 in 1899.

There are 96 nurses on duty in the Philippines, the majority employed in hospitals in and around Manila; the others are scattered among the larger post hospitals. Six are on transport duty en route to the United States.

On August 4, 1900, 11 nurses from the United States arrived in Tientsin, China, where they remained till the following November. Five were then ordered to Manila and the remaing 6 to hospitals in Pekin, where they remained until May 23, when they too were ordered to the Philippines.

On January 10, 1901, 5 nurses who were serving in Manila were ordered to report for duty to the commanding officer of the new United States hospital at Nagasaki, Japan. One of these has since been discharged; the others are on transport duty en route to the United States, having left the hospital June 3.

The law authorizes a reserve list of nurses. Those only who have given at least six months' entirely satisfactory service are eligible for such appointment. There are at present 37 names on this list and it is being rapidly increased as the records of nurses can be investigated.

The work of the nurses continues to be highly appreciated. Almost without exception the officers commanding hospitals where they are employed have words of commendation for their faithful and intelligent services and high degree of professional skill.

While the presence of female nurses is not considered desirable at post hospitals under ordinary conditions, a special necessity may justify an exceptional ruling in this regard. An outbreak of a severe type of typhoid at Fort Sam Houston, San Antonio, Tex., was the occasion of a request from the commanding officer to the Surgeon-General for 2 female nurses, who were immediately ordered there for duty.

There has been no death among the nurses in service during the year.

MEDICAL AND HOSPITAL SUPPLIES.

The operations of the supply department, fully described in my annual report for the year ending June 30, 1900, have been continued on the same lines during the last year. Medical and hospital supplies in abundance and of good quality, including all modern apparatus and appliances necessary to the proper diagnosis and treatment of diseases and injuries have been promptly furnished for the use of hospitals, military posts, and troops in the field. The three principal home depots at New York, St. Louis, and San Francisco are conveniently located for the purchase, storage, and distribution of supplies, and continue to serve their purpose with economy and efficiency to the department. Experience has shown that, with few exceptions, medicines and medical and hospital property of all kinds can be obtained to the best advantage from the Eastern States, and especially in the

New York market. For this reason the purchase of supplies has been made mainly through the New York depot, from which they are shipped direct to Cuba, Porto Rico, and the Philippines, distributed to posts along the Atlantic coast, or sent to replenish stock at other depots. Stations on the Gulf coast and Middle West are supplied from St. Louis. My efforts to secure more ample accommodations for the storage and preservation of supplies at San Francisco, Cal., have been successful, and the depot in that city is now securely located in a suitable building with sufficient floor space and facilities to meet the large and constant requirements made upon it by military posts on the Western border, in Alaska, Hawaiian Islands, and the Philippines, and by the numerous transports sailing from San Francisco, Portland, and Seattle.

With the improved and rapidly improving conditions in our foreign possessions, and the concentration and reduction of the military forces stationed there, the work of the supply department has been simplified and diminished. The necessity of rush orders and emergency action, unavoidable during hostile operations, is less frequent, and more opportunity for deliberation and the exercise of economy is presented.

Medical supplies left over from the China expedition and the hospital at Nagasaki, Japan, have been saved and shipped to Manila or to San Francisco, and those left by regiments sailing from Manila for the United States have been turned in to the depot there for reissue. It is estimated that the medical and hospital supplies now on hand in the Philippines, issued and in store, will be sufficient, with few exceptions, for the next twelve months. At the subdepots in Havana, Cuba, and at San Juan, P. R., there is also an accumulation of supplies beyond present needs, and it is proposed, after reserving sufficient to meet the requirements of the different military posts there for one year, to ship all remaining serviceable property to the depot in New York.

The subdepot at the Medical Museum building in this city has been in active operation during the year. Its purpose is to provide medical and surgical chests, Hospital Corps pouches, folding furniture, instruments, and other field equipment of new and improved pattern, and to refit old ones. I have devoted much attention to improving the standard of these important appliances, increasing their usefulness and their practical adaptation to the needs of the service, and it is my intention to accumulate a reserve supply sufficient to meet the early requirements of mobilization and keep it in readiness for immediate use.

Ice machines are in operation at seventeen points in connection with the hospital service, and prove of inestimable value in the treatment of the sick and comfort and health of the troops.

A medical supply depot was established last year at Fort St. Michael, Alaska, to which a liberal supply of medicines and hospital supplies were shipped, to be made available for issue to the posts in that Territory which could be reached from that point. This was done in order to save the delay that would be caused by waiting for requisitions and shipping the supplies after the requisitions were received. Supplies have since been sent to this depot to meet such emergencies as might arise and to replenish the stock at depot.

Since my last annual report a corps of contract dental surgeons has been attached to the Medical Department, which made it necessary to provide professional outfits of instruments and appliances required in their field and laboratory work, and to arrange these supplies for packing in secure and convenient form for transportation and use under the conditions presented in the military service. This has been successfully accomplished, and these equipments are now in the hands of dental surgeons at various stations from Porto Rico to the Philippines.

Under the Act of Congress approved February 2, 1901, all medicines and medical supplies purchased, repairs made or service rendered, except in emergency cases, must be obtained by competition among bidders after advertisement, and I desire to call especial attention to the disadvantages and impracticability of this method as applied to many of the purchases made by the Medical Department, and to urge that in the next appropriation bill a proviso be inserted to the effect that hereafter "advertisement shall not be required for the purchase of medicines and medical supplies or the engagement of services for the Medical Department of the Army, but that the same may be procured in open market at the lowest price obtainable in the manner common among business men." In the Act of February 27, 1893 (27 Stat. L., 485), it was provided, "That hereafter so much of section 3709, Revised Statutes, as requires advertisement before purchase shall not apply to the purchase of medicines and medical supplies." The proviso of 1893 was deemed by the accounting officers of the Treasury to be permanent legislation, and was held to be operative until the passage of the army appropriation Act of March 2, 1901. The latter provided that all laws inconsistent therewith were thereby repealed; and the Comptroller of the Treasury thereupon held that the proviso of 1893 was repealed, regarding the same as inconsistent with the second proviso under the appropriation for regular supplies, Quartermaster's Department, in the law of March 2, 1901. On account of their peculiar character it is quite often impracticable to fix in advance a standard upon which intelligent competition for medicines and medical supplies can be based. For example, there is no established standard for many drugs, medicines, and chemicals. Different bids for articles of the same name may be for articles of widely different quality, value, and usefulness. The bids, accordingly, are not comparable, and there is no genuine competition. The articles required must eventually be selected not with an eye to the lowest bid, but according to their quality and composition. These factors can be ascertained in a large proportion of cases only by chemical analysis. Moreover, many articles of this class, such as vaccine virus and diphtheria antitoxin, soon deteriorate. They can not, therefore, be kept in stock, but must be obtained at short intervals to meet the recurring necessities of the service. The expense, delay, and inconvenience of soliciting bids and executing the formal papers connected therewith for such frequently recurring purchases will, as a rule, overbalance any advantage of prices derived therefrom, even when dealers can be persuaded to go to the trouble and submit to the formalities incident to this method. Again, articles of hospital furniture or equipment and surgical instruments are for the most part of special construction or design, and often are not dealt in by the trade generally, but only by some one maker. Moreover, different makes of the same article or different articles of the same name have very different values, according to the skill with which they are made and the material employed in making them. The excellence of particular makes has been demonstrated to the Medical Department by many years of experience, and the Government is best served by the choice of articles of tested fitness. The only practical test in many cases must be actual service in ward or field. To require purchases from the lowest bidder under competition would, even when every reasonable care is taken, often result in the purchase of articles which, when exposed to the test of actual service, would prove to be unsatisfactory. Certain kinds of service also can be engaged to better advantage without advertising than under the formalities of competition. There is, for example, a great amount of hospital linen to be laundered in the course of a year, varying from time to time with the exigencies of the service. If the amount to be done could be fairly approximated, and were all to be done at one post or hospital, or even a few, the soliciting of bids and letting of contracts thereunder would be a simple matter. But the work must be done at a great number of places, often changing with the movements of the Army, and at frequent intervals. When done by individual launderers, as at detached posts, the work is now regarded as "personal service" under section 3709, Revised Statutes, for which no advertising is required. If done, however, by steam laundries, it is doubtful whether the exception would hold good, but it would entail great labor and delay to obtain bids and let the contracts for the large number of separate commands, hospitals, and transports. The repair of surgical instruments and hospital equipment, which frequently can only be done in a satisfactory manner by the firms and corporations engaged in their manufacture, can also be engaged more expeditiously and to better advantage by direct application to such firms and corporations than by soliciting bids. No substantial economy can be effected by the effort to obtain competition in such cases which will offset the enormous amount of paper work and administrative circumlocution incident thereto. I therefore earnestly recommend that the Medical Department be again enabled, as under the law prior to March 2, 1901, to go into open market at its discretion, and to that end urge the enactment of the proviso proposed above. This proviso, while it differs in words from the law of 1893, is designed to have the same effect. The new phraseology is, however, preferred as better adapted to accomplish that result, having in view the numerous provisions of law modifying section 3709, Revised Statutes, which have from time to time been enacted. Under the proposed law the Medical Department will, of course, be free to advertise for competition when that course is thought to be in the public interest.

MEDICAL INSPECTIONS.

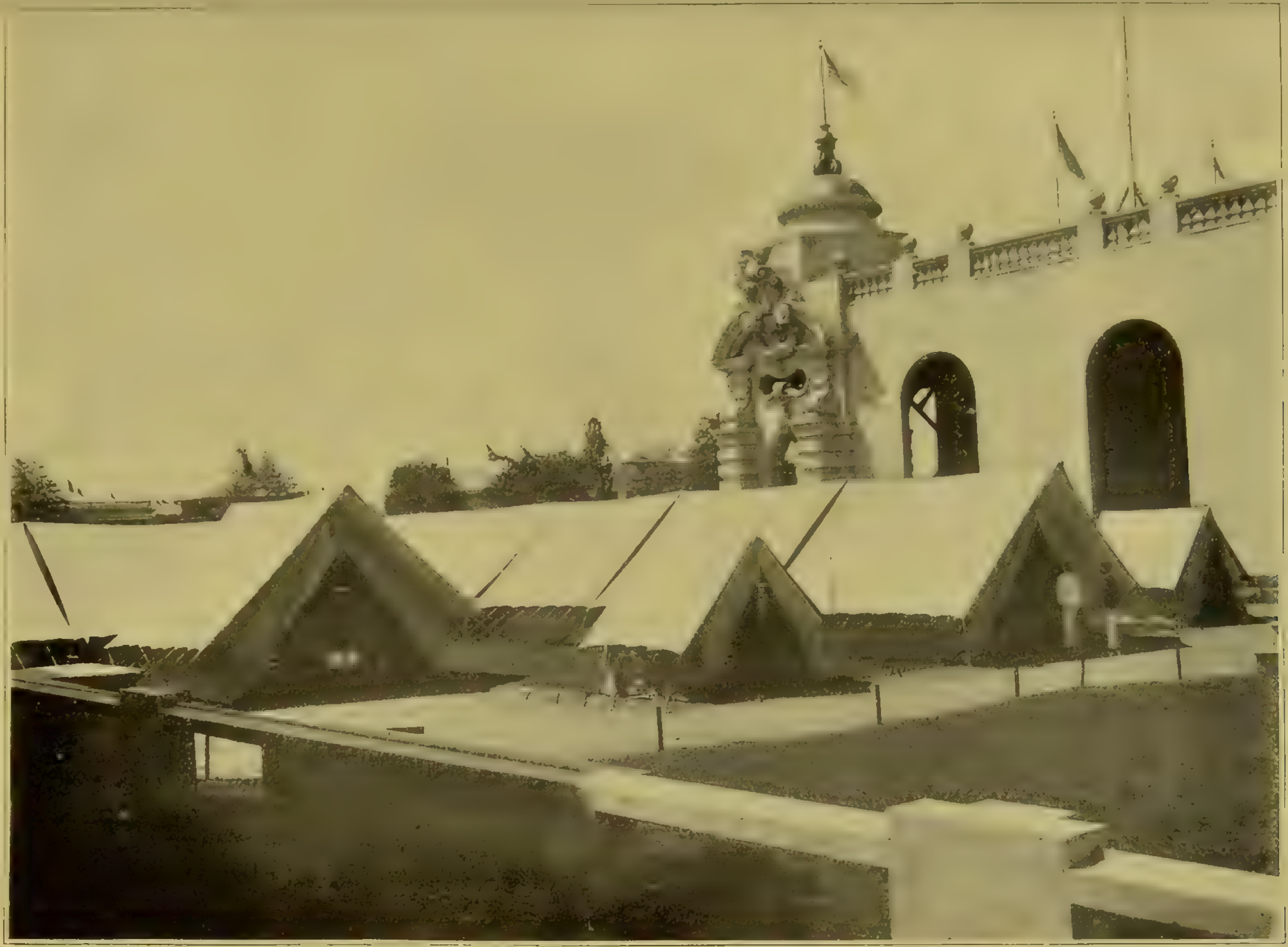
I would again respectfully renew my recommendation that the regulation, which has for several years practically interdicted systematic inspection by chief surgeons, and which regulation is continued in force in paragraph 1671, Army Regulations, 1901, be modified to read "Chief surgeons will visit each post in their departments at least once a year," etc. No argument in support of this would seem to be necessary. The work of the Medical Department is primarily with men and secondarily with materials. The men are the invalids, who represent a considerable percentage of the line of the Army, whose condition and wants can be intelligently appreciated only by an educated physician, and the personnel, the sanitary soldier, who cares for them. In other services the necessity for such inspection is admitted, and met by a corps of medical inspectors. Indeed, this was the case in our service during the war of 1861-1865. But since the promulgation of this regulation, which includes the period during and since the Spanish-American war, such medical inspections have been made irrespective instead of because of regulations.

EXHIBIT OF THE MEDICAL DEPARTMENT AT THE PAN-AMERICAN EXPOSITION, BUFFALO, N. Y.

In response to the request of the authorities of the Pan-American Exposition, Buffalo, N. Y., I recommended to the Secretary of War that the Medical Department place on exhibition at the exposition a fully equipped field hospital, having attached thereto a Hospital Corps personnel of sufficient size to furnish attendants and guards for the exhibit and to give exhibition drills in first-aid work and transportation of the wounded, believing that this exposition afforded an excellent opportunity for acquainting the general public with the equipment of the Medical Department, its methods and resources, and with the efficiency of the Hospital Corps. It was also requested by the exposition authorities that this Department make an indoor display in the Government building of material drawn from the Army Medical Museum and the library of the Surgeon-General's Office, but as the floor space available for this purpose amounted to but 400 square feet I was unwilling to recommend such an exhibit, since the latter, from the insufficient space, could not be made of a size and scope commensurate with the dignity and resources of this Department.

The exhibit, which was in charge of Capt. E. L. Munson, assistant surgeon, United States Army, consisted of a brigade field hospital of 100 beds, and was excellently located on a plot of ground immediately south of the Government building, very accessible to visitors and of sufficient size not only to contain the hospital tentage without crowding but also furnish an adjoining space suitable for drill purposes. The hospital was fully equipped in all its details according to the provisions of the latest supply table, the purpose being to leave nothing to the imagination of visitors, the majority of whom would be unfamiliar with military matters, but to demonstrate the equipment of the Medical Department in respect to the brigade-hospital unit in quantity, size, and capacity, as well as in form, variety, and quality. The exhibit was peculiarly unique and attractive, as the equipment displayed was almost wholly composed of articles lately incorporated in the supply table of this Department as a result of the recommendations of a board of medical officers who were engaged for nearly two years in the improvement of the hospital equipment and supplies. These articles had never previously been brought together for consideration as a unit in the field hospital, and their comprehensiveness, compactness, portability, and practical efficiency for the purpose indicated, as demonstrated in the exhibit made at the Pan-American Exposition, give occasion for much congratulation. Probably no such modern and complete equipment for the care of the sick and wounded in the field could be shown at the present time by any other army in the world. The exhibit has been inspected by a large number of officers of foreign services, who have personally and in their official reports given it the highest praise.

The hospital wards of the exhibit were arranged in the form of a cross, one arm of which ended directly at the steps of the arcade between the Fisheries and the main Government building, so as to serve as the main entrance and afford a very attractive view of the interior of the hospital to passing visitors. From the shape of the ground it was found possible to pitch but 12 ward tents, having a capacity



PARTIAL FRONT VIEW OF UNITED STATES ARMY BRIGADE FIELD HOSPITAL, PAN-AMERICAN EXPOSITION, BUFFALO, N. Y.

of 72 beds. The covered space at the intersection of the wards contained a large collection of radiographs and photographs illustrating the actual work of the Medical Department in the field. Between the arms of the cross were located the dispensary, office, surgical, mess, store, and kitchen tents, the line of tents of the Hospital Corps detachment being placed on the right flank of the hospital, with a graveled parade ground intervening.

The plot occupied by the hospital was sodded, except where graveled walks were necessary for communication, and the attractiveness of the exhibit as a whole was such as to elicit much commendation from visitors.

The morning and afternoon drills of the Hospital Corps detachment, the latter consisting of 3 noncommissioned officers and 20 privates, have proved an extremely interesting and instructive feature of the exhibit, attracting large crowds of visitors and exciting much favorable comment. The conduct of these men has been excellent, and their soldierly appearance and technical ability reflect much credit on the corps they have so well represented.

The number of visitors who have inspected the field hospital and witnessed the exhibition drills of the Hospital Corps is very great and my expectation that this exhibit would prove an attractive and interesting as well as instructive feature of the exposition has been amply justified. The character of the exhibit is such as would naturally attract military and medical men, and in addition the recent war with Spain and hostilities in the Philippines and in China have aroused a general interest in military matters. A large proportion of visitors at the exposition have had relatives or friends in the regular or volunteer forces, and these, particularly the women visitors, have shown much interest in the methods and appliances by which sick and wounded soldiers are cared for by this Department in the field. As a means of educating the popular mind with respect to the efficiency of the Medical Department this exhibit has thus been of very great value. Records of the attendance at the exhibit are being preserved and these show that the number of visitors inspecting the field hospital and attending the drills of the Hospital Corps detachment up to August 1 was probably equal to about 20 per cent of the total paid admissions to the exposition. During the first three months after the opening of the latter it is probable that about 500,000 persons inspected the equipment of the hospital and witnessed the exhibition drills, and with the increased attendance during the latter months of the exposition it is probable that nearly 1,500,000 persons will, by this means, have been educated to a better knowledge of the resources and workings of the Medical Department.

Since the foregoing paragraphs were written the preliminary statement of awards has been received, and is as follows:

> The Medical Department of the Army has established immediately south of the Government building a model brigade field hospital. Seldom has the public been able to inspect such an exhibit. It is especially interesting since it represents the new equipment of the Medical Department in the field—scarcely an important article of which but has been adopted since the outbreak of the war with Spain and has never been shown previously.
>
> The detail of enlisted Hospital Corps men give daily an exhibition drill in first aid to the wounded, litter drill, demonstrations of the various means of transporting the wounded, tent pitching, and hospital establishment. The drills are very popular, and in connection with them the hospital forms a most complete and creditable exhibit of the medical service of the Army.
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> We recommend the following for recognition: * * * Medical Department, United States Army, model brigade field-hospital drills.

RECRUITING.

The total number of men examined for enlistment in the Regular Army during the year 1900 was 39,916, of whom 38,115 were white and 1,801 were colored. The number accepted was 22,479, or 563.16 out of every thousand examined. The ratio of accepted men was 558.68 for the white and 657.97 for the colored. White men to the number of 75.77 and colored men to that of 43.86 per thousand declined enlistment. The rate of rejection on primary examination was 365.55 among the white and 298.17 among the colored candidates, giving a mean of 362.51. These statistics do not include among the rejections the cases of applicants who were so obviously unfit for the military service that they were rejected by the recruiting officer without being subjected to a medical examination.

The ratio of accepted men during the past year was considerably smaller than during the years immediately preceding. In 1897, a year of peace, the ratio was 702.19 out of every thousand examined. In 1898 during the active recruiting to increase the numerical strength of the Army the accepted men numbered 770.47 per thousand examined, but in 1899 the ratio decreased to 681.24 and during the past year to 563.16, showing evidently that greater care is exercised in the selection of men for the service.

Of every thousand of the accepted men 854.18 were natives of the United States, 39.01 were born in Germany, 33.94 in Ireland, 14.32 in England, 13.43 in Canada, 7.70 in Sweden, 5.69 in Austria, 4.94 in Russia, the remainder in various other countries. The war period, 1898–99, lessened very materially the ratio of foreign-born men enlisted for service. In 1897 the foreign born constituted 257.53 per thousand of the accepted recruits. In 1898 this ratio was reduced to 153.98, in 1899 to 144.39, and last year to 145.82.

Of every thousand men examined during the past year 89.42 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight, 56.04 for diseases of the eye, 48.90 for diseases of the circulatory system, 34.02 for diseases of the genito-urinary system, 30.56 for diseases of the digestive system, 24.28 for venereal diseases, 13.48 for hernia, while 11.65 were rejected as generally unfit or undesirable, 8.40 for diseases of the integument and subcutaneous connective tissues, 5.16 on account of bad or doubtful character, 4.38 as unclassified, 4.36 as minors, 4.13 for diseases of the muscles, bones, and joints, while only 2.73 were rejected on account of illiteracy, imperfect knowledge of the English language, or mental insufficiency.

Number of white and colored applicants for enlistment examined physically during the year 1900, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
Examined	38,115	1,000	1,801	1,000	39,916	1,000
Accepted	21,294	558.68	1,185	657.97	22,479	563.16
Rejected	13,933	365.55	537	298.17	14,470	362.51
Declined	2,888	75.77	79	43.86	2,967	74.33

In addition to the foregoing, 35 Indians were examined, of whom 25 were enlisted as scouts and 6 for regular service; 4 rejected.

Nativity of white and colored recruits accepted during the year 1900, with ratios per thousand accepted.

Nativity.	White.		Colored.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.
United States	18,025	801.86	1,176	52.32	19,201	854.18
England	322	14.32			322	14.32
Scotland	77	3.43			77	3.43
Wales	17	.76			17	.76
Ireland	763	33.94			763	33.94
Canada	299	13.30	3	0.13	302	13.43
Other British	23	1.02	2	.09	25	1.11
France	29	1.29			29	1.29
Belgium	5	.22			5	.22
Holland	21	.93			21	.93
Denmark	77	3.43			77	3.43
Norway	83	3.69			83	3.69
Sweden	173	7.70			173	7.70
Germany	877	39.01			877	39.01
Switzerland	66	2.94			66	2.94
Austria	128	5.69			128	5.69
Bohemia	23	1.02			23	1.02
Hungary	20	.89			20	.89
Poland	22	.98			22	.98
Russia	111	4.94			111	4.94
Finland	8	.36			8	.36
Italy	40	1.78			40	1.78
Others	85	3.78	4	.18	89	3.96
Total foreign	3,269	145.42	9	.40	3,278	145.82
Grand total	21,294	947.28	1,185	52.72	22,479	1,000

Causes of rejection among 39,916 candidates for enlistment examined during the year 1900, with ratios per thousand examined.

Number examined	White, 38,115.		Colored, 1,801.		Total, 39,916.	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Venereal diseases	872	22.88	97	53.86	969	24.28
Other infectious diseases	120	3.15	9	5.00	129	3.23
Diseases of the nutrition, general	42	1.10	4	2.22	46	1.15
Diseases of the nervous system	130	3.41	3	1.67	133	3.33
Diseases of the digestive system	1,195	31.35	25	13.88	1,220	30.56
Diseases of the circulatory system	1,910	50.11	42	23.32	1,952	48.90
Diseases of the respiratory organs	123	3.23	5	2.78	128	3.21
Diseases of the genito-urinary system	1,321	34.66	37	20.54	1,358	34.02
Diseases of the lymphatic system and ductless glands	34	.89	3	1.67	37	.93
Diseases of the muscles, bones, and joints	161	4.22	4	2.22	165	4.13
Diseases of the integument and subcutaneous connective tissue	327	8.58	8	4.44	335	8.40
Diseases of the eye	2,176	57.09	61	33.87	2,237	56.04
Diseases of the ear	196	5.17	6	3.33	202	5.06
Diseases of the nose	39	1.03	1	.56	40	1.00
Hernia	512	13.43	26	14.44	538	13.48
Other injuries	141	3.70	3	1.67	144	3.61
Overheight	2	.05	1	.56	3	.08
Underheight	181	4.75	11	6.11	192	4.81
Overweight and obesity	41	1.08			41	1.03
Underweight	805	21.12	20	11.10	825	20.67
Imperfect physique	2,418	63.44	90	49.97	2,508	62.83
Mental insufficiency	35	.92	1	.56	36	.90
Over age	10	.26	1	.56	11	.28
Minor	169	4.43	5	2.78	174	4.36
Married or having dependent relatives	76	1.99	7	3.89	83	2.08
Illiteracy	55	1.44	3	1.67	58	1.45
Imperfect knowledge of English	15	.39			15	.38
Reenlistment disapproved for various reasons	10	.26	7	3.89	17	.43
Character bad or doubtful	200	5.25	6	3.33	206	5.16
Reference, none or unsatisfactory	15	.39	2	1.11	17	.43
Aliens	3	.08			3	.08
General unfitness and undesirable	431	11.31	34	18.88	465	11.65
No vacancies	6	.16	2	1.11	8	.20
Unclassified	162	4.25	13	7.22	175	4.38
Total	13,933	365.55	537	298.17	14,470	362.51

VARICOCELE IN RECRUITS.

In view of the frequency of varicocele among recruits, of the infrequency of disability arising from this condition of the spermatic veins, and of the highly satisfactory results obtained by asceptic surgical intervention for its radical cure in cases in which complaint was made of an associated disability, the following circular was issued by me:

CIRCULAR
No. 3.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, February 27, 1901.

The attention of medical officers is invited to the accompanying papers relating to varicocele and its cure by surgical intervention. The rule laid down in Tripler's Manual should govern medical officers in the examination of recruits, viz: That a candidate for enlistment should be rejected if he has a varicocele which is larger than the sound testicle. If, however, upon a subsequent examination, after enlistment, a recruit is found to have a varicocele as large as or larger than the sound testicle and complaint is made of disability arising from it, this should not be considered a cause for discharge, but for surgical treatment.

In this connection attention is invited to the following decision published in Circular No. 11, Adjutant-General's Office, Washington, December 10, 1884:

"Except in case of a capital operation involving the risk of life, a soldier can not refuse to submit to medical treatment or surgical operation without subjecting himself to trial by court-martial for willfully avoiding treatment the purpose of which is to enable him to perform the duties for which he enlisted."

REPORT OF LIEUT. COL. A. C. GIRARD, DEPUTY SURGEON-GENERAL, UNITED STATES ARMY, GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., JANUARY 11, 1901.

The pubes are carefully shaved the day before operation; a soap poultice is applied and the patient kept in bed. Next morning, after the patient has been etherized, the pubes are scrubbed with soft soap and warm sterilized water, washed with warm sterilized water, then with alcohol, and then wiped dry. The finger is introduced by the spermatic cord into the inguinal canal until the external ring is felt. An incision is then made, corresponding to the axis of the canal, 1 inch long, the upper end ending over the external inguinal ring. Superficial and deep fasciæ are divided with angular scissors, preferably over a Kocher director. The vessels of the cord then come into view. The finger is passed under the cord by a little blunt separation and the cord is raised out of the wound. The spermatic duct and artery are returned as soon as possible into the bottom of the wound to prevent accidental injury. A sound vein selected for preservation to return the blood from the testicle is carefully separated from the strand of veins and carried alongside the duct. The veins are then dissected from the connecting tissue for a distance of about 2 inches, ligated with small-sized catgut at the end of these dissections, and cut off between the ligatures which are left 3 or 4 inches long. The ligatures are then tied together, the upper and lower ends of the veins being approximated, and for further safety threaded to needles and the ends united by stitches and finally anchored to the external pillar of the ring. The deep and superficial fasciæ are then carefully and separately united with a continued catgut suture, and the skin by a subcuticular suture of silkworm gut.

After a little practice this operation takes only a few minutes. The advantage over the Volckmann operation is that the seat of operation can be made absolutely sterile, which is almost impossible in the scrotum; that the scrotal tissue, being of a loose character and readily infiltrated, becomes a nidus for infection; that the scrotal scar will always be more or less tender, inconvenient and unsightly, while the suprapubic scar practically disappears, is invisible and not tender.

Sixteen cases have so far been operated on at this hospital. The men all recovered without any drawback and were returned to duty. Three of the men belong to the Hospital Corps and are now on duty at this hospital. They do not feel the slightest inconvenience from the operation, consider themselves practically cured, and there is nothing visible to show that they have ever had an operation performed. Special reports were transmitted in each case at the end of the month during which the operations were performed.

Below is a list of men showing hospital number, name, organization, and date of operation.[1]

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[1] It is not considered necessary to publish this list. The first reported case was operated on October 10, 1899, the last November 14, 1900.

The idea of this operation was first received from Dr. C. R. Krone, of Berkeley, Cal., although I am informed by Colonel Forwood that this had been his method of operating at the United States Soldiers' Home, Washington, D. C.

The operation is easy and, if necessary, the patient might be discharged from hospital in two or three days, while scrotal operations, as a rule, take longer to heal.

REPORT OF MAJ. J. M. BANISTER, SURGEON, UNITED STATES ARMY, UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y., JANUARY, 12, 1901.

All surgeons who have been in practice a little more than a decade have seen a great revolution in the operative technic for the radical cure of varicocele. Before the advent of modern aseptic methods our attempts at the cure of this condition were bungling, imperfect, and unscientific, and as a consequence our results were unsatisfactory and uncertain. Such procedures as the amputation of the redundant scrotum; the subcutaneous passage of a silver wire around the veins, or presumably around the veins, and the fastening of the ends of the wire to a button or yoke, applied at the point of their exit from the scrotum, with a daily tightening of the wire loop until the tissues in its grasp were cut through; the subcutaneous use of a silk ligature around the veins, which was tied tightly and the knot pushed into the scrotum were recommended and practiced. All these methods I have tried, but I am free to confess that my results were not satisfactory, and in those days I never attempted the cure of varicocele with the slightest feeling of confidence. Now, thanks to modern aseptic technic, the skilled surgeon no longer works blindly, but by the open method exposes the enlarged veins, ligates and excises them to the needed extent, closes the wound, and confidently expects first union and a perfect cure. The technic which I have pursued for some years in the surgical treatment of varicocele will now be described, but I wish in advance to disclaim any originality in this matter, as in working in this line I have simply been following in the steps of Professors Halsted and Bloodgood, of Johns Hopkins University.

The patient is prepared as for any other aseptic operation requiring the administration of an anæsthetic. The day before the operation he is placed upon a liquid diet and given a saline purge. Operating, as I do, almost invariably in the afternoon for reasons of convenience, the patient early on the morning of the operation is given a cup of broth, which is to be his only food that day. He is then required to take a bath, the hair on the pubes and scrotum is shaved, and a wet bichloride dressing applied. After the patient has been etherized and placed upon the operating table the antiseptic dressing is removed, and the region of the operation, including the scrotum, is thoroughly scrubbed, first with soap and water, then with ether, and finally with a solution of bichloride of mercury, 1 to 1000. The patient is then covered with sterilized towels, the site of the proposed wound in the groin only being uncovered. The hands and arms of the surgeons and assistants having been sterilized and all those assisting in any capacity being dressed in freshly sterilized linen gowns and trousers, the surgeon commences the incision just above the spine of the pubic bone and carries it upwards and outwards for about 1½ or 2 inches, somewhat parallel to Poupart's ligament. I seldom make a longer incision than the one first designated. After dividing the skin I grasp the underlying layers of fascia with a mouse-toothed forceps in one hand, and with a dull dissector in the other tear through the layers until the external abdominal ring is exposed and the tunica propria of the cord comes into view, the layers of fascia being exposed throughout the whole exent of the wound. During this procedure the wound is held open by means of two small retractors. When the cord contained in its proper sheath has been clearly exposed the sheath is seized with the forceps and divided longitudinally, when the large veins constituting the anterior portion of the cord become visible. The vas deferens and other structures of the cord behind this group of veins must be interfered with as little as possible. This anterior group of veins should now be grasped between the fingers at the lower extremity of the wound and pulled upwards so that a portion of their extent contained in the scrotum near the upper termination of the pampiniform plexus may be brought into plain view in the wound. This can be done with the greatest ease and with the gentlest traction. What is desired by this maneuver is the drawing up of the enlarged and tortuous portion of the veins from the scrotum into the wound for ligation and excision. Having brought the veins to be treated into view, they are held by a pair of forceps in the hands of an assistant or upon a blunt hook passed under them, and an aseptic silk or kangaroo ligature is passed around them en masse at as low a point as desired, tied tightly and one end of the ligature cut off, the other end being, for the time, left uncut. The same veins are similarly treated at a point about 1¼ inches higher up, and the portion included between the ligatures excised and removed. The uncut ends of the ligatures are now tied, thus drawing together the severed ends of the veins, not with the object of securing end to end union, which would be impossible, but with the expectation that the testicle will be temporarily held up until adhesion shall have formed. After being thus treated, the veins are pushed down into the scrotum, where the ligatures can be easily felt between the thumb and finger. The wound is then closed either by interrupted sutures of silkworm gut or by a subcuticular continuous suture of kangaroo tendon, which latter is now my favorite method of closing aseptic skin wounds. The wound is dressed with dry aseptic gauze and cotton, and the whole held in place by a gauze spica bandage. The testicle, which is not covered by the bandage, is supported during the period of confinement to bed, and a suspensory bandage is ordered for constant use for a few months after complete recovery. The wound is redressed in one week, when the sutures are removed if silkworm gut has been used. The patient is allowed to sit up in ten days. For a time there will be a swelling of the obliterated veins below the ligature, but this rapidly subsides, and soon only a small lump can be detected in the scrotum.

Report of cases.—I have operated quite often in the manner described, having at times performed two varicocele operations at one sitting. The complete records of my operations performed elsewhere are not available, but I have the records of 16 operations for the radical cure of varicocele performed at West Point, N. Y., which, with the exception of case 4, are almost identical in results with those previously performed. In all my cases operated upon before my coming to West Point there was first union, a complete cure of the varicocele, and no atrophy of the testicle. This much I know, although I have not the names of the patients nor the histories of the cases at hand. The histories of the 16 cases operated upon at West Point will now be given:

Case 1.—Cadet C. B. C. Operation by high incision January 10, 1899. Result: Union per primam; no epididymitis; returned to duty with a perfect cure February 1, 1899. This cadet left West Point February 15, 1899, in consequence of graduation and is now an officer on duty in the Philippines.

Case 2.—Cadet F. P. A. Varicocele, left side. Operation by high incision March 24, 1899. Result: Union per primam; no epididymitis; returned to duty with a perfect cure May 4, 1899. Graduated in 1900 and is now an officer of the Army. This cadet remained for over a year at West Point after the operation and never had the least trouble up to the time of his departure.

Case 3.—Private R. Van V., Army service detachment. Operation by high incision performed May 29, 1899, in my presence by First Lieut. D. F. Duval, assistant surgeon, United States Army. Result: The wound healed by first union; no epididymitis. I have just examined this man, who is still on duty at West Point, and find the testicle unaffected. There has resulted, however, a small hydrocele, which gives no trouble of consequence.

Case 4.—Cadet T. N. G. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size. His military duties in camp caused the veins to enlarge very rapidly, and by August 11 the varicocele had attained a size that made an operation necessary to enable him to remain at the Academy. On the date mentioned I operated in accordance with the method described. The patient did well, the wound healed per primam, and there was no epididymitis. During convalescence the testicle was bruised several times, causing a little swelling of the gland. This cadet was returned to duty September 2, 1899. A little while after leaving the hospital he received a contusion of the left testicle in the gymnasium, which caused a decided swelling of the gland, though the injury did not give rise to an acute orchitis. I have just examined this cadet, sixteen months after the operation, and find a small hydrocele present and the testicle on the operated side somewhat larger than the other. He states, however, that he has never had the least trouble referable to the testicle or scrotum, and that he performs his military duties and exercises with ease. a condition in marked contrast to that existing prior to the operation.

Case 5.—Cadet G. R. G. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size, which, after about two months of duty in camp, became increased in size to a degree which prevented him from performing his military duties. On August 14, 1899, I operated by the method described. The wound healed per primam; there was no epididymitis; no swelling of the testicle, and in fact not an untoward sympton. He was returned to duty September 3 with an absolutely perfect cure. I have examined this cadet within the last few days, sixteen months after the operation, and find the result perfect. There is no atrophy of the testicle, no enlargement of the veins, nor any evidence that there ever has been any trouble of any kind.

Case 6.—Cadet R. C. T. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size, which rapidly enlarged in consequence of the military duties of camp until it became necessary to operate. I performed the operation on August 16, 1899. This cadet made a perfect recovery, with no complication, and was returned to duty September 3, 1899. I have recently examined this cadet, sixteen months after the operation, and find the result perfect.

Case 7.—Cadet B. B. McC. Like the three preceding cases, this cadet was admitted to the Academy in June, 1899, with a moderately sized varicocele, which rapidly increased in consequence of the duties required of him in camp until an operation became necessary. On August 19, 1899, I performed the operation as described. A perfect recovery ensued. There was no sign of any complication during convalescence. This cadet was returned to duty September 3, 1899, with a perfect cure. I have just examined this cadet, sixteen months after the operation, and find the result absolutely perfect.

Case 8.—Cadet J. P. R. Varicocele, right side. Before coming to the Academy this cadet had been operated on by a civilian surgeon for varicocele on the left side. The incision used at that time was through the scrotum. Adhesions had formed between the cord and the scrotal wound, which caused the patient inconvenience, and singularly there had resulted a tendency to sweating on this side, which would be wet with perspiration, while the other side remained dry. A troublesome varicocele having developed on the right side during service at the Academy, this cadet applied to me for operation. I performed my usual operation on October 31, 1899, which was followed by no complication, and resulted in a perfect cure. The result of the high operation stood in flattering contrast to that through the scrotal incision. This cadet was returned to duty November 28, 1899, graduated in June, 1900, and is now an officer of the Army.

Case 9.—Cadet N. C. M. This cadet applied to me in November, 1899, for relief from a troublesome varicocele, and I operated upon him November 15, 1899. The wound healed by first union, the cadet recovering without a complication and with a perfect cure. This cadet was returned to duty December 26, 1899, and graduated in June, 1900, being now an officer of the Army.

Case 10.—Private J. S. C. C., Company E, Battalion of Engineers. Varicocele, left side. The high operation was performed by my assistant, First Lieut. F. M. Kemp, assistant surgeon, United States Army, January 11, 1900. The wound healed per primam and a perfect recovery, without a complication, resulted. This soldier was returned to duty February 14, 1900, and is now on duty with his company in the Philippines.

Case 11.—Cadet V. La S. R. On January 16, 1900, I operated upon this cadet in accordance with my usual technic. He recovered without a complication and was returned to duty on February 17, 1900, with a perfect result. In June, 1900, he left the Academy in consequence of graduation and is now an officer of the Army.

Case 12.—Private A. J., detachment of cavalry. Operated upon by me February 5, 1900. This soldier was returned to duty February 21, 1900. I have examined him within the last few days, eleven months after my operation, and find the final result absolutely perfect. There is no evidence that there has ever been any abnormity in this case.

Case 13.—Cadet F. O. W. On March 18, 1900, the operation by the high incision was performed in this case. The wound healed by first union; there was no epididymitis nor swelling of the testicle, and the cadet was returned to duty cured May 19, 1900. He graduated in June, 1900, and is now an officer of the Army.

Case 14.—Cadet J. W. W. Operation performed March 8, 1900. The case progressed without a complication and the cadet was returned to duty with a perfect cure on April 21, 1900. He graduated in June, 1900, and is now an officer of the Army.

Case 15.—Cadet A. P. S. H. Operation performed March 20, 1900. There was not the slightest complication in this case, the wound healing per primam and the patient returning to duty April 18, 1900, with a perfect cure. He graduated in June, 1900, and is now an officer of the Army.

Case 16.—Private C. McI., detachment of cavalry. Varicocele, left side. Operation in accordance with the writer's technic was performed by First Lieut. F. M. Kemp, assistant surgeon, United States Army, April 10, 1900. The wound healed per primam, there was no epididymitis or other complications and a perfect cure resulted. The patient was returned to duty May 19, 1900. I have within the last few days examined this soldier and find the result absolutely perfect.

Résumé.—In reviewing the histories just given it will be seen that in the 16 cases recorded there has been first union in every case and that there has been no epididymitis as an immediate result of the operation nor any instance of atrophy of the testicle as a final sequence. A perfect result was obtained in 14 out of the 16 operations recorded. In one case, No. 4, the testicle on the affected side is at the present time, sixteen months after the operation, found to be somewhat larger than its fellow gland and a small hydrocele is discoverable. The patient, however, considers his cure perfect. Another case, No. 3, shows a moderate hydrocele, which is of no practical importance as it does not interfere with the performance of the soldier's duty.

General considerations.—Among my own cases and those of my former junior colleagues, Assistant Surgeons W. F. Lippitt, John H. Stone, and Basil H. Dutcher, which were subjected to operation before my coming to West Point, and which are not included in the histories given above, I have never known of a single case that did not result in a perfect cure. In 1897 I saw one case, which has just been operated upon by one of my colleagues mentioned, in which the scrotum was distended with blood, presumably from a slipping of the lower ligature. This was remedied by the surgeon who performed the first operation, and I was informed that an excellent result had been secured.

It can be appreciated, therefore, that when carefully performed the operation for varicocele is one of the most successful of surgical procedures, and that its possible disadvantages are so slight as to justify the surgeon in ignoring them when called upon to decide as to the advisability of operating in a given case. The high incision with the ligation and excision of the veins is without question the ideal operation for varicocele. It has decided advantages over the incision through the scrotum with few of the disadvantages of the latter.

The advantages of the high incision are:—

1. The scrotal portion of the enlarged veins can be reached with the greatest ease through a small incision placed at the point of election.

2. The results of the operation through the high incision are better than those obtained by means of the incision through the scrotum.

Dr. Bloodgood's statistics are as follows:

"Incision in the scrotum, 16 cases. Ultimate result in these cases: Lost track of since operation, 10 cases; testicle normal, 4 cases; small hydrocele, testicle normal, 1 case; complete atrophy of the testicle, 1 case.

"Incision in the groin, 29 cases. Ultimate result in these cases: Lost track of, or recent cases, 12 cases; no atrophy of testicle, 12 cases; hydrocele, 5 cases; atrophy of testicle, 0 case. Healing of wounds, scrotal incision per primam, 12 cases; suppuration, 4 cases. Healing of wounds, incision of groin, per primam, 27 cases; suppuration, 2 cases."[1]

3. First union can almost certainly be counted upon in the high incision. In my personal experience I have invariably secured union per primam in my varicocele wounds when located in the groin.

The disadvantages of the incision through the wall of the scrotum are the following:

1. The difficulty of securing perfect asepsis, owing to the locality of the wound.

2. The tendency of the contractions of the dartos to drag on the wound, causing gaping, thus opening the way for pyogenic infection.

3. Greater liability to atrophy of the testicle.

Referring again to my own statistics, I can say that I have never seen a case of epididymitis or atrophy of the testicle resulting from a varicocele operation performed by me. My results have been absolutely perfect, except in case 4, where traumatism occurred during and after convalescence, and in the case cited the relief from former inconvenience is at the present time so great that the patient considers himself cured.

I conclude this paper by advancing the following propositions:

1. The operation for the radical cure of varicocele by the high incision, with ligation and excision of the veins, is one of the most successful of surgical procedures.

2. The operation is without risk to life in the case of a patient without disease of vital organs.

3. That it is well adapted to the military service.

4. That no soldier otherwise sound should be discharged from service on account of varicocele.

5. That it should be the duty of the medical department of the Army to cure these cases, compelling compliance on the part of the soldier where objection is urged.

REPORT OF CAPT. W. C. BORDEN, ASSISTANT SURGEON, UNITED STATES ARMY, UNITED STATES GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., FEBRUARY 9, 1901.

I have operated for varicocele in twenty-two cases, and have used two methods—subcutaneous ligation and excision. The cases by subcutaneous ligation were thirteen in number and were done several years ago. This method I no longer consider worthy of consideration, as it has been entirely superseded by the more accurate and satisfactory method of operation by excision.

Operation by the open method with excision of the veins.—In operating by this method one of two incisions may be practiced—above the pubes over the external inguinal ring or through the front of the scrotum. I have used both incisions, having operated about an equal number of times by each, and believe the suprapubic method to be by far the safer for general work; but in certain cases, where the scrotum is quite long and relaxed, I prefer the incision through the scrotum when I am absolutely sure of my asepsis. The operation for varicocele is one which requires extreme care in the aseptic technic, and this is particularly the case if the operation is done through the scrotum, as the laxity of the tissues, the deep rugae of the skin, and the deep sebaceous glands in this region tend to harbor infection, which if it occurs is invariably followed by prolonged suppuration and sinuses which have no tendency to heal, thus necessitating a secondary operation. Aside from the prolonged suppuration which follows infection, this is dangerous to the testicle in that the inflammation about the blood vessels may seriously interfere with the organ or may even infect it and produce atrophy.

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[1] See Dr. Joseph C. Bloodgood's paper in "The Johns Hopkins Hospital Reports, Vol. VII," page 350.

In my nineteen cases operated upon by the open method primary union was obtained in all but one case. This case was operated upon by the scrotal route. It occurred at this hospital, and was the first surgical case I operated on here. At that time the conditions were not favorable to absolute aseptic work, and this, in connection with the incision through the scrotum, accounted for the infection. Fortunately the infection was not severe, and I am inclined to believe that, other conditions being equal, had the operation been done by the suprapubic route no infection would have occurred. With asepsis thoroughly under control the scrotal route may be chosen in certain selected cases, especially in those in which the scrotum is elongated, for by sewing the incision transversely the scrotum may be shortened. But as the main danger in the operation for varicocele arises from infection of the wound, the suprapubic method is to be preferred when most rigid asepsis is required.

Aseptic technic.—The patient is prepared by shaving the pubes, scrotum, and adjacent parts and applying a dressing of green soap the night before the operation. Green soap is preferred to a bichloride dressing in that it loosens the epidermis and allows a thorough cleansing. The patient having been placed under an anaesthetic, the parts are thoroughly scrubbed with green soap. They are then rinsed with sterile water, scrubbed with alcohol, then with bichloride solution 1:1000 and rinsed with sterile water. The penis is carefully enveloped in a sterile cloth, and the operator and his assistants all wear rubber gloves. I now use rubber gloves in all my operations, and consider them of the greatest value in furthering asepsis.

The operation by the suprapubic route.—The incision is made above the pubes and over the external inguinal ring, nearly parallel to Poupart's ligament, and about an inch and one-half in length. It is carried down until the external ring is exposed and the cord brought into view. The sheath of the cord is now opened and the veins which lie at the anterior portion of the cord are seen. In varicocele the enlarged veins lie at the anterior part of the cord and in front of the vas deferens and spermatic artery. If care be taken these veins can be lifted up and away from the vas deferens and artery and isolated from the latter by passing a blunt hook beneath them. Having done this, the veins can be separated by blunt dissection from the underlying structure of the cord well down toward the testicle by pulling them up as the dissection proceeds. Having done this, the operator should determine the position of the vas deferens and artery to be sure that he does not include them in his ligature. The veins being brought well out through the incision, a ligature is passed about them above and another ligature is tied about them below well down toward the testicle. The intervening portion is excised and the cut ends approximated and tied together by the ligatures. The wound is now closed by a subcuticular suture of catgut, covered with sterile gauze, cotton, and a spica bandage.

Dangers of the operation.—The danger of infection has already been discussed. The remaining danger is atrophy of the testicle from inclusion of the vas deferens or spermatic artery in the ligatures. This the operator must be careful to avoid, and is easily done by careful attention to the structures involved before the ligature is passed.

Operation by the scrotal route.—As before stated, this operation is not advised except in special cases and when the operator is absolutely sure of his aseptic technic. The operator, standing on the left of the patient, grasps the cord between the thumb and forefinger of his left hand, pressing the cord up to the anterior surface of the scrotum and holding the testicle retracted in the palm of his hand. Holding the knife in his right hand, he makes an incision about an inch long through the skin and cuts carefully down to the cord which he is pressing upward with the left thumb and forefinger. By holding the cord firmly to the front of the scrotum in the manner indicated and cutting carefully, the distended veins are soon brought into view, and this with much less dissection and consequent disturbance of the tissues than occurs when the incision is made into the body of the scrotum and the cord searched for. The veins having been brought into view the operator, still holding the cord to the front with his thumb and forefinger, frees them to a sufficient extent to pull the cord out of the incision. Having done this, he holds aside the vas deferens and separates it from the enlarged veins. The most difficult part of the operation now begins. The operator, grasping the cord, feels for the pulsation of the artery, and having found it dissects the artery free from the veins. This is sometimes quite difficult and troublesome to do, but the artery should by no means be included in the ligature with the veins, as atrophy of the testicle will very probably result. Having separated the vas deferens and artery from the veins, the latter are freed well down to the testicle and well up to the external inguinal ring. A catgut ligature is then passed around the veins above and tied, the ends of the ligature not being cut off. The veins are ligated below in a similar manner and the part between the stumps excised. The stumps are approximated and tied together, using the ends of the ligature for this purpose. This raises the testicle higher in the scrotum than it was before the operation and does away with the sagging of the organ. The skin wound is closed by subcuticular catgut suture or with interrupted suture of horsehair. A dressing of sterile gauze covered with absorbent cotton is placed over the closed wound and a suitable bandage is applied.

Results of operations.—The results of the operation are always good, provided it is done aseptically and the operator does not include the vas deferens or spermatic artery in his ligature. In my 19 cases I had one infection which, as stated before, was slight and did not lead to any serious trouble. So far as I know there was no atrophy of the testicle in any case and the cure was radical in all.

General conclusions.—As a result of my experience I am of the opinion that a varicocele which produces disability and which has originated in the service should not be considered a cause for a discharge, but should always be operated upon provided the operator is so situated that he can be reasonably sure of asepsis.

Report of Capt. A. E. Bradley, assistant surgeon, United States Army, Fort Snelling, Minn., December 22, 1900.

A description of the method of operation in these cases can not be found in any text-book available, but I am not prepared to claim that it is new. I was prompted to employ it in the first instance in the case of a soldier concerning whom the surgeon of his post persistently claimed the existence of hernia. Reports of this case, Private C. R. L., Troop H, First Cavalry, were forwarded August 15 and October 26, 1900.

In view of the opinion of the surgeon at Fort Meade, S. Dak., it was deemed advisable to expose the inguinal canal and the abdominal rings and at the same time operate for the varicocele, the existence of which was evident. An incision about 2 inches long was made in the line of the inguinal canal well down toward the base of the penis. The cord was exposed external to the external ring and easily drawn forth with the mass of varicose veins. The testicle itself was drawn out and fully exposed with great ease. The veins were excised, the stumps drawn together shortening the cord, and the testicle replaced. The abdominal rings and the canal were found normal. A few catgut sutures closed the deeper structures and subcuticular silkworm-gut suture the skin incision. A collodion dressing was applied, and convalescence was normal.

Case 2.—Trumpeter L. E. S., Troop G, First Cavalry, was admitted from Fort Yellowstone, Wyo., October 20, 1900, for operation for varicocele. In view of the ease of operation, as I found it in L.'s case, I determined to use the same method. The usual preparations were made, and I operated October 21, 1900. A small incision was made as before, the cord exposed and dragged up and out, the veins ligated and excised, without, however, delivering the testicle out of the incision. The wound was closed as in the first case, and the result was perfectly satisfactory.

Case 3.—Sergeant J. W. M., Company A, Eighth Infantry, was admitted to hospital October 8, 1900, for chronic sciatica, and while in hospital expressed a desire to be operated upon for varicocele. Operation was performed as in case 2 with a perfect result.

I believe this method to have advantages over the scrotal method. There is greater probability of perfect preparation and less danger of wound infection. The wound is well up on the pubes and away from sources of infection.

The difficulty of avoiding wound infection in scrotal work is well known. Owing to the thin and relaxed walls of the scrotum and the cremaster action, it is difficult to keep perfect apposition of the parts divided in the scrotal operation. In the high operation this is avoided.

EXTRACTS FROM A PAPER BY LIEUT. COL. NICHOLAS SENN, CHIEF SURGEON, UNITED STATES VOLUNTEERS, CHIEF OF OPERATING STAFF WITH THE ARMY IN THE FIELD, FROM HIS WORK ON THE MEDICO-SURGICAL ASPECTS OF THE SPANISH-AMERICAN WAR.

For years I have been convinced that too many operations are being performed for varicocele, and I have always advised my students to limit operative intervention to the exceptional cases in which well-marked symptoms warranted such a course. Most of the persons suffering from this affection that apply to the surgeon for treatment are sexual neurasthenics, young men who have made a deep study of this subject with the aid of quack literature. In the great majority of cases the symptoms presented are due to a morbid mental condition rather than the varicosity of the spermatic veins. I have frequently observed that the size of the varicocele bears no relation to the degree of suffering and distress complained of by the patients. Recent experience has only confirmed my views concerning the relationship of varicocele to the subjective symptoms associated with this condition. During the month of May I had, as a member of the examining board, an opportunity to examine, at Camp Tanner, Springfield, Ill., 9,815 recruits for the volunteer service. I took special pains to investigate varicocele as a cause of disability. From the very beginning I was surprised at the prevalence of this affection. I classified the cases according to the number and size of the varicose spermatic veins into (1) small varicocele, (2) medium-sized varicocele, (3) large varicocele. The disease was found more frequent in the robust strong than in men of slight build. In most instances the men were otherwise in excellent condition. Atrophy of the testicle was seldom noted. The subjects of large varicocele were invariably questioned as to whether or not this pathologic condition gave rise to discomfort or pain, and, with the exception of three or four cases, the replies were always negative. In more than half the cases that presented themselves the men were ignorant of the existence of the affection. * * * The result of these observations led me to the conclusion that varicocele is very seldom a cause of disability for military service, and that operative treatment is rarely indicated. This short communication is made for the distinct purpose of calling attention to the frequency with which varicocele is met with in otherwise healthy and robust subjects, and in formulating a serious and positive protest against the too frequent recourse to operative interference so common with surgeons of all grades and in all civilized countries.

The following table shows that of 9,815 recruits examined 2,078 were affected with varicocle—that is, 21.17 per cent. * * * These statistics are absolutely reliable and fortify my position taken in this paper that varicocele in varying degrees is met with in nearly one out of four men between the ages of 18 and 30 years, and that of itself it seldom gives rise to any noticeable disturabnce, and that the patients who apply for treatment do so in consequence of nervous disturbances entirely separate and independent of the enlarged spermatic veins. I am satisfied that in many of these cases an operation is superfluous, provided the surgeon can secure the full confidence of the patient, which is an essential prerequisite to successful treatment short of an operation. For my own part I shall not perform as many operations for varicocele since I have had an opportunity of studying the pathologic and clinical features of this affection on such a large scale.

GEO. M. STERNBERG,
Surgeon-General, United States Army.

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

From July, 1890, the time of the first identification, to June 30, 1901, 2,298 identifications have been made: 18 in 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, 108 in 1896, 68 in 1897, 347 in 1898. 480 in 1899, 351 in 1900, and 265 during the first half of 1901.

Of the 1,682 men identified up to the end of 1899, 401 were retained in service. 844 were discharged from the Army, and 437 deserted. The disposition of the men identified during 1900 can not be given, owing to a number of cases being still under investigation.

HOSPITALS.

During the year the general hospitals in Manila, P. I., which were fully described in my last annual report, pages 108-116, have been in excellent condition and the departmental hospitals compare favorably with them. Both were outfitted with all modern equipments. Regimental hospitals of varying capacity have fulfilled their purpose as emergency hospitals, but in progress of time as the troops become established in permanent posts these regimental hospitals will have to give place to carefully organized post hospitals.

The Second Reserve hospital, which was established in a brick building formerly used as a boarding school for girls, was closed July 1, 1901, and its patients, hospital-corps men, and nurses transferred to the Santa Mesa hospital. Its equipment was in part distributed to other hospitals and in part placed in store in the medical-supply depot.

The full equipment of a 100-bed hospital was established at Nagasaki, Japan, in January, 1901, with a sufficient personnel, Capt. I. W. Rand, assistant surgeon, United States Army, in command. This was intended for the purpose of taking from passing transports sick and wounded men who were not in condition to continue the voyage to or from the United States.

The post hospitals built at the new posts in Cuba are such as to give the sick soldier all the advantages of modern treatment with the best hygienic surroundings. They consist of frame pavilion buildings with free ventilation, double roofs and wide porches, the wards large, to give unrestricted air movement. None of the old Spanish stone hospitals are now in use except at the post of Holguin.

Excluding from consideration the Army and Navy General Hospital, Hot Springs, Ark., and the general hospital, Fort Bayard, N. Mex., supra page 13, both of which are devoted to special lines of medical work, there have been during the past year only two general hospitals in service in the United States: The general hospital at Washington Barracks, D. C., having a capacity of 50 beds, and the general hospital at the Presidio of San Francisco, Cal., with a capacity at the present time of 650 beds, but susceptible of a prompt extension to meet emergencies. The latter hospital is the home depot for the reception of invalids from the Division of the Philippines. The report from this hospital is given below:

REPORT OF THE UNITED STATES GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., FOR THE FISCAL YEAR ENDING JUNE 30, 1901, LIEUT. COL. A. C. GIRARD, DEPUTY SURGEON-GENERAL, UNITED STATES ARMY, COMMANDING.

In the annual report of this hospital for the year ending June 30, 1900, a brief history of its establishment was given, together with a detailed description of the buildings. During the past year the power house, including the ice and refrigerating plant, heating and electric system, and laundry, have been completed and put in operation. There has also been completed a building at the southern end of the patients' mess hall which will be used as a chapel and library for the hospital. The large number of patients received during the year has necessitated the use of six wooden barracks belonging to the post, which have been pretty constantly occupied.

On June 10, 1901, the northeast portion of the hospital was destroyed by fire. This portion included the following buildings: Patients' dining room, patients' kitchen, bakery, cold-storage room, medical storeroom, ordnance storeroom, quartermaster storeroom, carpenter shop, paint shop, hospital corps dining room and kitchen, ward F, tent hospital for 45 tents, lavatories and tent hospital, and a portion of ward G. The losses occasioned by this fire will be more fully referred to in another portion of this report.

In preparing the report of the hospital it has been thought best to divide it into the following sections: The general administration, medical work of the hospital, surgical work of the hospital, certificates of disability, eye, ear, nose, and throat clinic, bacteriological laboratory, X-ray laboratory, and report upon insanity. In this way a more thorough knowledge of the immense amount of work which has been accomplished during the year can be gained, and the facts pertaining to each department grouped in their proper places.

General administration.—There have been but few changes in the administration of the hospital during the year. The detailing of a permanent staff of medical officers has greatly facilitated and increased the accuracy and value of the work. In a hospital such as this, where the patients arrive at irregular intervals and in large numbers, it is impossible to satisfactorily conduct the service without a certain number of permanent medical officers. At times the influx of large numbers of patients within short intervals has severely taxed the administrative work of the hospital. This has been especially true during the last three months of the fiscal year, during which time the United States Volunteers were being mustered out of the service.

I. *Report of the quartermaster.*—The following statement shows the purpose, amount authorized, and amount expended in repairs, alterations, and improvements made or in progress at the hospital during the fiscal year:

Date authorized.	Amount authorized.	Amount expended.	Purpose.
QUARTERMASTER-GENERAL'S OFFICE.			
Apr. 17, 1900	$1,891.26	$1,891.26	From funds fiscal year 1900 for tin roofing verandas.
May 3, 1901	500.00	450.00	For painting verandas and railings and calcimining hospital corps and nurses' quarters.
July 27, 1900	1,720.00	1,747.25	For general repairs, materials, and labor.
Nov. 6, 1900	200.00	200.00	For materials and labor for installing tub, closet, and washstand in administration building.
Nov. 15, 1900	135.50	97.20	Laying floor under diet kitchen.
June 14, 1901	75.00	75.02	For repairing roof, Ward G.
Mar. 21, 1900	384.00	405.60	From funds fiscal year 1900 for laying tile and lowering floor in operating room.
Oct. 5, 1900	21.60		
Oct. 4, 1900	47.50	47.50	For adjusting blow-off to boilers.
Oct. 8, 1900	325.00	325.00	Installing additional laundry machinery.
Feb. 16, 1900	214.60	214.60	For laying surface guttering.
May 9, 1901	434.38	381.89	For making changes to water system.

Total expended from funds fiscal year 1900	$2,296.86
Total expended from funds fiscal year 1901	3,538.46

A new chapel has been constructed by the chief quartermaster, Department of California, at a cost of $2,700.

In addition to the work done for which allotments were made the roadways about he hospital have been graded with cinders and rolled, the inclosures in the rear of he hospital fenced (this work being done by enlisted men), and the grounds about he hospital surfaced, properly graded, and sown with blue-grass seed. A tent hospital of fifty beds was established, the floors and walls being of wood. Electric lights were placed in each tent, two lavatories built for use of same, the plumbing system onnected, and sidewalks laid in front and rear of the wards.

The floor of the operating room was lowered and a tile floor put in. The floors of he diet kitchen were reenforced to keep them from settling, on account of the heavy concrete floor, while those of the wards and administration building and patients' mess hall were polished with hard oil finish. An additional bath tub, water-closet, and washstand were installed on the second floor of the administration building. The sewer pipe in the rear of the administration building was found to be too small, easily becoming clogged, and was replaced by a larger one. About 715 feet of brick guttering has been laid during the year, greatly improving the sanitary condition of the hospital.

The installation of the steam, electric light, laundry, and refrigerating plant has been one of the most valuable additions to the hospital. Not only has this plant proven of great value because of the promptness and ease with which the work has been executed, but also because it has resulted in a great financial saving to the hospial. The following table will show the monthly cost of operation of the plant, together with the former cost of the work which it performs and the resulting monthly saving. Plant began operation August 28, 1900.

Monthly cost of operation:

Engineers	$180
Firemen	100
Laundrymen	55
Laundrywomen	50
Oil, repairs, ammonia	75
Coal	700
Total	1,160

Cost per month before installation of steam, electric-light, laundry, and refrigerating plants:

Average cost of lighting per month (figures furnished by quartermaster's department)	$940.62
Average cost of laundry	918.42
Average cost of ice (figures furnished by subsistence department)	74.28
Total	1,933.32
Former cost	1,933.32
Present cost	1,160.00
Monthly saving	773.32
Saving in laundry for post, transports in harbor, etc	500.00
Total monthly saving	1,273.32

The laundry, which was opened August 23, 1900, and in which the laundry work of the general hospital, the hospitals of all the posts in the vicinity of San Francisco, and of all transports plying between San Francisco and Manila, is in the charge of a hospital steward, and employs one chief laundryman, two women, and four hospital corps men eight hours daily.

Its machinery consists of three 150-sheet washers, one 24-inch and one 20-inch centrifugal extractor, two mangles, each with one 64-inch cylinder and two 11-pound electric irons, all of which are operated by a 15-horsepower electric motor.

The steam drying room has nine compartments and occupies a floor space of 7 by 8 feet, and is capable of drying 1,000 sheets per day. Each morning the soiled linen is collected from the wards and exchanged from the linen room at the laundry for clean. Each afternoon, after these soiled articles are washed, they are counted and stored in the linen room to be issued again the next day. In this way each article of linen is daily accounted for. The average daily output is 2,500 pieces to laundry, which requires 50 pounds of soap, 10 pounds of caustic soda, 10 pounds of chlorid of lime, and 1 pint of blueing.

The following transportation has been furnished by the quartermaster during the year:

Patients to Fort Bayard, N. Mex	124
Patients to Hot Springs, Ark	216
Patients to various stations	70
Total patients	410
All other transportation	225
Transportation for messengers	805
Packages transferred	1,326

During the year the quartermaster has issued clothing to patients and detachment of hospital corps to the value of $12,967.28.

The following is a statement of the funds pertaining to the quartermaster department expended during the fiscal year:

Regular supplies	$5,016.87
Incidental expenses	384.40
Army transportation	1,257.05
Barracks and quarters	2,600.67
Clothing and equipage	10.00
Total	9,268.99

II. *Report of the commissary officer.*—The number of rations issued during the year has been 87,752. The average number of men and women to whom rations were issued has been 238.

The following disbursements were made during the year:

Paid for food supplies	$56,623.40
Commutation of rations	5,081.00
Paid for fresh beef (under contract), savings, labor, etc	6,910.64
Total expended during year	68,615.04

The average number of patients supplied has been 447, and commutation of rations has been paid to 825 men.

III. *Property office.*—The work in the property office has been under the charge of a contract surgeon, United States Army, who has been assisted by one acting hospital steward and two privates of the hospital corps, one acting as property clerk and the other as storekeeper. The handling of the medical property has been conducted in the following manner:

Requests for supplies have been put in every two weeks. On receipt of supplies from the supply depot they have been carefully checked over with the packer's list by either the steward or storekeeper, and the supplies then placed in the storeroom, from whence they are only issued by orders signed by the ward surgeons and O. K.'d in the property office. Upon arrival the drugs were turned over to the dispensary storekeeper. The property storekeeper sends to the office his report of daily issues, when the invoices are then made out by the clerk and signed by the property officer. The ward officers and those in charge of the various departments render a monthly statement of property received, disposed of, and lost, and these reports are then checked over with the invoices and receipts, and the losses covered by affidavit. The invoices from the medical supply depot are carefully compared with the packer's list, and receipts, after being also compared, are signed by the commanding officer.

The fire June 10, 1901, originated in such close proximity to the storerooms that practically the whole stock on hand was destroyed. Since the fire the storeroom has been located in one of the wards, where one or more of the men connected with the property office always remain.

IV. *Dispensary.*—The dispensary is in charge of one acting hospital steward and two privates of the hospital corps. It is open from 6 a. m. to 9 p. m., and during the night one man remains subject to calls from the bell attached to the outer door. The dispensary is thus accessible for emergencies at all hours.

In addition to drugs upon the supply table there are carried in stock about 150 medicines. The medicines and liquors, with the exception of small quantities used from day to day, are arranged according to the supply table in the storeroom designated for that purpose.

A stock book has been kept showing amount on hand the first of each month, the amount received, and the amount expended, thus enabling the steward in charge of the dispensary to render requisitions for medicines needed without carrying any excess of stock on hand. A liquor book is kept which contains an accurate report of alcoholics used in each ward during the month and the date of each issue. A monthly report is rendered to the executive officer, while the original prescriptions for liquors are retained on file in the book kept for that purpose.

All prescriptions are written in the metric system, and except in cases of emergency presented at the dispensary before 10.30 a. m. Each ward is furnished with a suitable receptacle for carrying medicines from the dispensary and each prescription bears the name of the ward for which it is intended. During the fiscal year the average daily number of prescriptions dispensed has been 200.

V. *Record Office.*—The personnel of the record office is as follows: One hospital steward, in charge; 1 acting hospital steward, 10 clerks, and 1 orderly.

The following records and books are kept: Register of patients, regulars; register of patients, volunteers; index to register of patients; "letters received" book, with index; "letters sent" book, with index; consolidated morning report book; record of deaths and interments; record of summary court; monthly report of sick and wounded; monthly post return; file of retained copies of S. C. of D.; descriptive and clothing book, with index; muster and pay rolls; file of clinical histories of patients, together with copies pathologist's report of sputa, blood, fæces, and urine examinations; records of cases tabulated under headings in accordance with classified lists of causes of admissions to sick report as laid down in the Manual for the Medical Department.

One hospital steward acts as chief clerk and is responsible for the proper conduct of the clerks in the office and for the proper preparation and filing of records.

One acting hospital steward (1) has charge of surgeon's certificates of disability. (2) Prepares file cards showing under headings in accordance with classified lists cause of admission to sick report as laid down in the Manual for the Medical Department, with the hospital number of each case. These hospital numbers are entered on the cards in black ink in the cases of regulars, and red ink in the cases of volunteers. Thus upon reference to the file cabinet the card headed with any one disease or injury shows at a glance, not only how many cases under that heading have been treated at the hospital, but also the hospital number of each case for immediate reference to register of patients. (3) Arranges and keeps file of clinical histories of patients and prepares for file therewith copies of the pathologist's reports of sputa, blood, fæces, and urine examinations.

One clerk is detailed in charge of the "letters received" book and furloughs.

One clerk in charge of "letters sent" book, summary court record and ledger, showing valuables deposited by patients.

One clerk (1) has charge of consolidated morning report book and daily numerical report book by organizations. He also prepares a daily list from his books of the number of patients in hospital who live on 40 cents per day; the number of discharged soldiers for whom rations are drawn; the number of quartermaster employees and retired soldiers to be charged 40 cents per day, and the number of officers who are to pay $1 per day for subsistence. (2) Prepares monthly post return.

One clerk has charge of descriptive lists of patients and superintends the preparation of final statements, discharges, and new descriptive lists.

Two clerks prepare under the direction of the clerk in charge, who must be a good accountant, discharges, final statements, and descriptive lists; keep the clothing book of patients, and prepare clothing schedule of patients.

One clerk has charge of the register of patients, prepares monthly report of sick and wounded, keeps record book of deaths and interments, and prepares transfer slips for patients transferred.

Two clerks (1) keep record of pay, clothing, etc., of patients and note all changes as they occur on card-index register, from which, when a patient is ordered discharged or otherwise disposed of, all necessary data for the preparation of final statements, etc., are furnished. (2) Prepare pay and muster rolls of patients from the card-index register.

One orderly, used as a messenger, keeps files of the orders and circulars, cares for the circulating library, and polices the offices. This force under ordinary circumstances will be able to perform the work of a 400 to 600 bed hospital, but occasionally there is a demand for a large amount of work, such as discharging volunteers "services no longer required" or on surgeon's certificate of disability, which calls for a temporary increase.

VI. *Patients and hospital corps mess.*—The personnel of the mess department of the United States Army general hospital, Presidio of San Francisco, Cal., consists of a mess officer, who has under his charge 1 hospital steward, 1 acting hospital steward, 2 civilian employees, and 20 privates of the hospital corps. It includes 2 kitchens and 2 dining rooms for the patients, a kitchen and dining room for the hospital corps, and a mess storeroom, from which supplies are issued to the kitchens and wards. It also includes a bakery, which employs 1 civilian baker and 1 to 2 hospital corps men when in operation.

The duties of the hospital steward of the mess consist in supervising the details of preparation of diets for the sick, the cooking for the hospital corps, and the management of the bakery. He receives and checks all food supplies for the hospital in the mess storeroom and accounts for them in a proper form of receipt. Upon the requisition of the ward surgeon and cooks, he issues these supplies daily at a stated time; the requisitions are his vouchers for dropping the supplies on proper forms of supplies issued. He prepares daily a morning report, showing the number of patients in hospital and the allowance to be expended per day. This report also shows the daily total amount expended and the balance or deficit for the day. A supplementary report, showing the daily expenditures in detail, accompanies this form. Daily trips are made with a market wagon to the city to purchase fresh fruits, vegetables, butter, and eggs. Extra supplies, not kept in the commissary, are purchased from various firms in the city by bid forms under the direct supervision of the commanding officer.

During the year ending June 30, 1901, an average of 466 patients were fed daily from the diet kitchen of the general hospital, and in addition 1,935 casuals were fed who passed through the hospital for examination (after arrival in transports from the Philippines).

Recently difficulty has been experienced in maintaining the high standard of diet adopted at this hospital from the allowance of 40 cents per day for each enlisted patient. This is due to the large decrease of enlisted patients with the allowance of 40 cents per day and the increase of patients as discharged soldiers too sick to travel, who were allowed but a ration in kind yet actually required the same special diet furnished other patients. The number of these patients increased upon the muster out of each regiment until the actual allowance per patient per day was but 31½ cents, computing value of the ration in kind furnished to muster-out patients at 15 cents per ration. In addition extra quantities of food were frequently required by wards in excess of the number of patients reported. This was corrected by a circular order published July 26, 1900, as follows:

"PAR. 1. Attention of the ward officer is invited to the numerous discrepancies occurring on their 'special diet list and diet orders,' the number of special diets reported on the diet order not corresponding with the number of special diets asked for on diet list.

"Hereafter the number of special diets asked for must not exceed the number of patients who are actually on such diet in the wards.

"Patients on liquid diet requiring articles of special diet will be classed as special, instead of liquid. It is thought the amount of food furnished for each diet is ample and sufficient, and the practice of asking for an excess above the number of diets required is not necessary."

As per diem allowance per patient was continually decreased under the influence of a continuous increase of discharged soldiers and a decrease in the 40 cents per diem patient, it becomes necessary to modify the diet table, and the following orders were issued on May 17, 1901, and a substitute special-diet table published:

"PAR. 3. The daily order list of special diet, form No. 20, is suspended until further orders.

"Ward surgeons will hereafter use the diet order only, showing the number of liquid, special, light, and full diets required for the current day. All patients will be sent to the mess hall for meals as soon as able to eat the prescribed full diet."

At the same time the light and full diet orders were modified to meet the existing conditions.

Two kitchens and dining rooms have been kept in operation for the use of the patients. A third kitchen is operated for preparing food for contagious cases whenever required. The kitchens and dining rooms are under the immediate direction of an acting hospital steward. One chief cook, at $60 per month, and one assistant cook, at $40 per month, are employed in this kitchen. Five privates of the hospital corps are on duty in the kitchen and three privates of the hospital corps in the dining room at the general hospital proper. Two privates of the hospital corps are on duty in the auxiliary kitchen at the wooden barracks. The number of men employed in these kitchens and dining rooms are increased and reduced according to requirements of the service. In addition, two privates of the hospital corps are on duty in the mess storeroom. Three men on duty in the dining room have the police and care of all things pertaining to that room.

During the year four steam-jacketed boilers for cooking soups, meats, etc., two steam kettles for cooking vegetables, one egg boiler, and two 60-gallon urns for tea and coffee, with 80-gallon urn for hot water, were placed in the kitchen, making it one of the best-equipped hospital kitchens on the coast.

The food carriers for the wards and dining rooms, which were designed by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army, rendered efficient and valuable service as conveyances, and have proved so valuable that no change from the original model, except as to size and pattern of wheels, could be suggested. These have been modified in the new cart now in use.

The efficiency of the personnel of the hospital corps and civilians on duty in the kitchen and dining rooms is excellent, each individual being especially adapted to the duties he performs. The work in the kitchen, preparing the various diets and serving the same, is well and expeditiously performed.

During the year, load after load of transport sick have passed through this hospital, hundreds simply passing through for examination. All, however, were fed as soon as they arrived at the hospital. The men have frequently prepared a dinner or supper on less than an hour's notice to 450 new arrivals, and this without deviation from the regular bill of fare.

When the kitchens and dining rooms were destroyed by fire at 4 p. m., June 10, 1901, and all food on hand was burned, a new kitchen was opened, new supplies purchased and cooked, and supper served at 7 p. m., only one and one-half hours later than the schedule time.

During the twelve months from July 1, 1900, to June 30, 1901, these men prepared and served 510,839 meals.

Meal tickets are used for patients messing in the dining room. A check is kept on these by entering the number received at each meal from the respective wards and comparing this number with the ward diet orders.

The bakery connected with the kitchens did good work during the year, the bread baked being of superior quality. Two grades of flour are used in baking—the issue flour and family flour. In addition, 3 gallons of skimmed milk are used for each 150 loaves of bread. The bread made is of an even, fine texture, white, and does not dry out as readily as the ordinary post bread.

An ice plant at the hospital furnished sufficient ice for the needs of the hospital. In addition thereto a cold-storage room is located in the basement of the kitchen for the preservation of meat and other perishable articles.

Milk is delivered at the hospital daily at 6 a. m. and 11.30 a. m. It is tested for purity and cream once a week in the laboratory, and has always been found to be of a high standard. A large amount of milk is employed in the preparation of koumiss, in which form it is given to many patients.

When yeast for koumiss is desired by ward surgeons it is ordered from the mess steward twenty-four hours in advance of the time when it is desired for use. Orders state the number of bottles of koumiss to be made. The required amount of yeast will then be furnished.

On June 10, 1901, the entire culinary department of the hospital was destroyed by fire. The destruction included the patients' kitchen and dining room, hospital kitchen and dining room, the mess storeroom, the bakery, cold-storage room, and vegetable storeroom. Everything was destroyed by this fire. So rapid was its spread that nothing could be saved. Immediately after the fire, ward H was temporarily fitted up as a kitchen and dining room and is now in use as such until the completion of the kitchen and dining room, which are being rebuilt.

Bread has been purchased from a city bakery at a cost of 3 cents per loaf, since the date of the fire. It is expected that the bakery will reopen within a few weeks.

The hospital corps kitchen and dining room have been moved to barracks No. 5 of the auxiliary hospital buildings in the post proper. The food of the hospital corps is varied as much as possible by addition of fresh vegetables and fruits and change of meats. It is well cooked, of an excellent quality and sufficient variety.

The female nurses have a separate kitchen and dining room from the hospital corps, under charge of a nurse. A woman cook and two Japanese waiters are employed. The savings of rations of female nurses and a small percentage of money received from sick officers for board is allowed their mess and credited on the hospital fund statement. The amounts so credited are expended for their benefit under the supervision of the nurse in charge of the mess. Any excess of expenditures which may be incurred is met by a voluntary individual assessment levied upon themselves.

VII. *Telephone and telegraph department.*—Connected with the hospital is a regular Western Union telegraph office, as well as a city official telephone and a pay telephone. Besides these, there are three local systems.

System No. 1: System No. 1 connects the general hospital with the auxiliary hospital, the lower corrals for the use of ordering ambulances, conveyances, etc., and to the hospital electric and heating plant, and the office of the steward in charge of the mess. The lines and instruments used in this system belong to the signal department of the United States Army.

System No. 2: A local system connecting all the offices of the hospital, commanding officer, executive officer, chief nurse, record office, quartermaster's office, officer of the day, hospital corps detachment, hospital kitchens, and ten wards. This system is entirely confined to the general hospital, and the lines and instruments used are the property of the Signal Department of the Army.

System No. 3: This system, known as the Presidio local exchange, connects the general hospital with the post hospital, Presidio, Presidio post headquarters, and the quarters of the commanding officer of the hospital. This system is connected with the Presidio post exchange, whereby the general hospital can be connected with all the offices and departments of the Presidio post and with the forts in the harbor of San Francisco, i. e., Fort Mason, Fort Baker, Alcatraz Island, Angel Island, and Fort Scott. The lines and instruments used in this system belong to the Signal Department of the United States Army.

Long-distance connections are transacted over the official telephone, the general hospital being a regular long-distance station.

The personnel of the telegraph and telephone department consists of two privates of the hospital corps; each of whom works seven and one-half hours per day, relieving each other respectively. At 10 o'clock at night the telegraph department is closed and the guard in charge of the administration building answers the telephone and transacts the business necessary from that time until opening of the office at 7 o'clock in the morning.

The approximate number of Western Union messages sent since the opening of the office November 9, 1900, has been 1,800.

The approximate number of Western Union messages received since the opening of the office November 9, 1900, has been 1,700.

Copies are kept on file of all messages received and sent since the opening of the office. The office has handled the personal business of the inmates and employees of the hospital in addition.

The city official telephone is for the transaction of official business pertaining to the hospital. Daily reports are kept of the switches made and the business transacted, and these reports are inspected daily by the commanding and executive officers.

The approximate number of messages sent over the official telephone for the year ending June 30, 1900, has been 12,000.

VIII. *Printing office.*—In the printing office is done all the printing of forms needed in the administrative work of the hospital. The printing outfit consists of the following: A Gordon press, capable of printing a sheet 12 by 15 inches; a Challenge paper cutter, with a 14-inch blade; a letterpress; and 25 fonts of type, ranging in size from 6 point to 30 point. The press is run by foot power and can not stand high speed. It gives a clear, reliable print, but has to be constantly watched because of worn parts.

During the year five cases of new type have been added, and with the useful cases already on hand the office can properly handle all the regular work of the hospital.

The personnel of the printing office consists of two privates of the hospital corps. A large part of the work consists in printing the forms for the reports and records. Of these there are 98 numbered forms, and a great many which it has been found impracticable to number. The unnumbered forms are such as index cards, bed cards, baggage checks, meal tickets, etc.

The miscellaneous work of the printing office consists of printing labels for books and bottles, general orders, special orders, circulars, programmes, letter heads, addresses on envelopes, signs, notices, and note heads.

During the past month, in which the office did the average amount of work, 43 regular numbered forms were printed, making in round numbers 36,000 blanks. Most of the tabulated blanks required from two to three forms and impressions. In this list is not included the miscellaneous work done in the office during that time.

A very limited amount of printing has been done for places other than the general hospital. In June this office printed two tabulated forms and two straight forms for the school of instruction on Angel Island, two straight forms for the post quartermaster, and two for the muster-out camp.

Work which is completed in the printing office for use in one department of the hospital only is delivered to that department. If it is for general use it is kept in the printing office and issued as needed.

IX. *Hospital corps.*—The hospital corps of the hospital is divided into a permanent and casual detachment. The average number per day of men on duty in both detachments during the fiscal year is given below:

	Daily average strength.	Sick.
Permanent detachment:		
Hospital stewards for duty	3.92	0.12
Acting hospital stewards for duty	5.26	.20
Privates for duty	130.47	5.05
Casual detachment:		
Hospital stewards	1.01	1.31
Acting hospital stewards for duty	1.25	.09
Privates for duty	11.27	18.74

Confinement.

Permanent detachment:	
Hospital stewards	0
Acting hospital stewards	0
Privates	1.50
Casual detachment:	
Hospital stewards	0
Acting hospital stewards	0
Privates	.48

The following rules and regulations concerning the nospital corps have been issued during the year:

"Men desiring to leave the hospital on pass will apply to the steward in charge of the detachment before 9 a. m., and no passes will be approved after that hour unless in case of extreme urgency.

"Men applying for passes are expected to avail themselves of the same, and no one will be permitted to remain around the hospital during the hours named on pass unless it has previously been turned in.

"Upon leaving the hospital each man will possess himself of his pass and upon returning will turn in the same to the door guard, who will note the hour of return on the pass. No one will be permitted to leave the hospital corps quarters by the window in the front of the building, but must pass through the administration building.

"Check passes will be granted as often as the exigencies of the service permit at the discretion of the commanding officer. Passes to extend to or beyond reveille will be granted once a week.

"Men desiring to go on pass during the hours of duty will have the same indorsed by the officer or steward in charge of their work and will be presented for signature of the detachment commander with other passes at the designated hour.

"Men will be permitted to leave the hospital when off duty till 11 p. m. without pass. Members of this detachment will not be permitted to leave the hospital either with or without pass unless they are neatly and cleanly dressed. When in soldiers' clothing, the blue undress uniform will invariably be worn. Shoes must be polished, and the white collar must be worn. Civilian clothing may be worn while on pass, but no mixed uniform will be allowed.

"After 6 p. m. men going on pass will make down their beds before leaving the hospital, and upon returning after 9 p. m. will remove their shoes as soon as they enter the hallway. No loud or boisterous conversation will be allowed in the lavatories or hallways after that hour, and no unnecessary noise will be permitted in or around the squad rooms.

"Anyone failing to comply with these rules will be denied pass privileges for such length of time as the gravity of the case warrants. Repeated failures will entail severer punishment."

X. *Female nurses.*—The work of nursing the sick at this hospital has been entirely performed by female nurses under the charge of a chief nurse. During the year 142 female nurses have reported at this hospital, of whom 90 were transferred to the Philippine Islands, 9 to Fort Bayard, N. Mex., 1 to Fort Sam Houston, Tex., and 42 were discharged from the service.

The number of nurses on duty June 30, 1900, was 40, which number has been retained throughout the year.

MEDICAL WORK OF THE HOSPITAL.

The medical work was attended to practically by contract surgeons, of whom a certain number had been detailed permanently to this hospital. As a rule, 1 medical officer has had charge of two wards of 40 patients each.

Connected with the medical work of the wards there has been in operation an X-ray and bacteriological laboratory and an eye, ear, nose, and throat clinic. The details of the work done in each of these will be found in other portions of this report. The entire medical work of the hospital has been under the charge of a medical superintendent.

A very large percentage of the cases received at this hospital are suffering from diseases of the gastro-intestinal tract, most of them being cases of chronic enteritis or dysentery. The results achieved in the treatment of these cases have been far from discouraging, as will be seen by the low rate of mortality during the period of time since the hospital has been in operation.

The total number of patients admitted to the hospital during the fiscal year was 5,587, divided as follows:

Regulars, 2,813; volunteers, 2,278; discharged soldiers, 496.

The patients in this hospital have been derived from the following sources: Transports from the Philippine Islands, admissions from the model camp, Presidio, San Francisco, Cal., admissions from civil life in the case of discharged soldiers, and readmissions from various sources.

The number of patients received from transports has been 3,513.

The following is a tabulated statement of the transports which have brought patients to this hospital, with the date of arrival and the number of Regulars and Volunteers which were entered in the hospital as patients:

Transport.	Date of arrival.	Regulars.	Volunteers.	Total.
Hancock	July 14, 1900	104	153	257
Warren	July 28, 1900	27	18	45
Logan	Aug. 6, 1900	61	0	61
Sherman	Aug. 7, 1900	58	65	123
Thomas	Aug. 30, 1900	154	116	270
Grant	Sept. 23, 1900	141	87	228
Sherman	Oct. 19, 1900	209	137	346
Meade	Oct. 31, 1900	112	85	197
Logan	Nov. 16, 1900	127	65	192
Thomas	Dec. 2, 1900	138	62	200
Hancock	Dec. 11, 1900	116	49	165
Grant	Dec. 31, 1900	107	65	172
Sherman	Jan. 7, 1901	110	84	194
Warren	Feb. 3, 1901	59	105	164
Sheridan	Feb. 6, 1901	63	66	129
Indiana	Feb. 27, 1901	106	77	183

Transport.	Date of arrival.	Regulars.	Volunteers.	Total.
Meade	Mar. 1, 1901	24	29	53
Hancock	Mar. 12, 1901	0	18	18
Buford	Mar. 13, 1901	0	5	5
Kilpatrick	Mar. 17, 1901	177	43	220
Logan	Mar. 29, 1901	0	20	20
homas	Apr. 15, 1901	2	30	32
Rosecrans	Apr. 18, 1901	3	0	3
Grant	Apr. 19, 1901	91	48	139
Garonne	Apr. 20, 1901	0	9	9
Sheridan	May 18, 1901	3	40	43
Hancock	June 2, 1901	0	7	7
Pennsylvania	June 18, 1901	0	6	6
Ohio	June 21, 1901	0	9	9
Grant	June 25, 1901	0	16	16
Logan	do	0	33	33
Thomas	June 26, 1901	0	33	33
Buford	June 27, 1901	0	21	21
Kilpatrick	June 28, 1901	0	20	20
Total		1,992	1,521	3,513

During the year there have been 182 deaths, divided as follows: Regulars, 74; Volunteers, 96; discharged soldiers, 12. The cause of death in each case will be found n the report of the pathologist of the hospital.

During the year 116 patients were transferred to Fort Bayard, N. Mex., to receive reatment for pulmonary tuberculosis. These cases were divided as follows: Reguars, 81; Volunteers, 35.

One hundred and seventy-three patients were transferred to Hot Springs, Ark., Army and Navy General Hospital) for treatment. These cases were divided as folows: Regulars, 152; Volunteers, 21.

NOSOLOGICAL INDEX OF DISEASES TREATED IN THE UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO, SAN FRANCISCO, CAL., SINCE JULY 1, 1899, TO THE END OF THE FISCAL YEAR JUNE 30, 1901.

The following nosological index has been compiled with a great deal of care from he records of the hospital. While it can not be said to be complete in every instance, t gives a general idea of the number and character of the cases which have been admitted to this hospital. It will be noticed that the total number of cases classified n this index does not equal the total number admitted to the hospital, but this is explained by the fact that the diagnoses in many of the cases admitted have been uncertain character and have not been included in the index, although they might be included under the vague head of "undetermined diagnoses."

The index is arranged according to the divisions given in the Medical Manual:

I.—*Infectious diseases, general and local.*

Diseases.	Regulars.	Volunteers.	Total.
Scarlet fever	1	1	2
Measles	162	54	216
Variola	4	22	26
Vaccinia	36	40	76
Varicella	0	1	1
Influenza	22	1	23
Malarial fever, pernicious	2	1	3
Malarial cachexia	127	117	244
Erysipelas	4	4	8
Septicemia	1	1	2
Mumps	63	28	91
Diphtheria	8	12	20
Typhoid fever	76	131	207
Cerebro-spinal meningitis	2	0	2
Rheumatic fever	16	8	24
Malarial fever:			
Intermittent	329	314	643
Remittent or continued	51	92	143
Tuberculosis of lungs	124	99	223
Tuberculosis of other organs	5	2	7
Carcinoma	8	1	9
Sarcoma	1	0	1
Syphilis	75	42	117
Gonorrhea	69	72	141
Gonorrheal epididymitis and orchitis	46	48	94
Chancroid	133	118	251
Other diseases of this class	15	26	41
Total	1,380	1,235	2,615

II.—*Diseases of nutrition, general.*

Diseases.	Regulars.	Volunteers.	Total.
Anemia	34	19	53
Glycosuria	1	1	2
Total	35	20	55

III.—*Structural and functional diseases.*

A.—DISEASES OF THE NERVOUS SYSTEM.

Disease.	Regulars.	Volunteers.	Total.
Alcoholism:			
Acute	5	19	24
Chronic	2	14	16
Delirium tremens	3	2	5
Chorea	3	1	4
Epilepsy	20	16	36
Insanity	135	80	215
Locomotor ataxia	1	1	2
Meningitis	2	3	5
Myelitis	4	1	5
Neuritis	7	11	18
Neuralgia	15	3	18
Neurasthenia	17	6	23
Nostalgia	2	1	3
Paralysis	30	26	56
Other diseases of this class	12	7	19
Total	258	191	449

B.—DISEASES OF THE DIGESTIVE SYSTEM.

Corrosive and irritant poisons, effects of	1	0	1
Tonsillitis	79	49	128
Peritonitis, acute	0	4	4
Dyspepsia	24	10	34
Gastritis	129	123	252
Colic	4	0	4
Constipation	38	14	52
Tenia	2	7	9
Diarrhea:			
Acute	30	81	111
Chronic	153	183	336
Enteritis	94	96	190
Appendicitis	38	23	61
Dysentery:			
Acute	1	5	6
Chronic	813	815	1,628
Hemorrhage, intestinal	1	1	2
Fistula in ano	15	18	33
Hemorrhoids	57	71	128
Biliary colic and calculi	1	1	2
Jaundice, catarrhal	2	9	11
Hepatitis	3	1	4
Other diseases of this class	30	38	68
Total	1,515	1,549	3,064

C.—DISEASES OF THE CIRCULATORY SYSTEM.

Angina pectoris	4	0	4
Cardiac irritability	6	5	11
Pericarditis	4	5	9
Endocarditis	11	5	16
Valvular disease and results	50	15	65
Embolism	1	0	1
Aneurism	5	0	5
Varicose veins	9	11	20
Phlebitis	5	4	9
Other diseases of this class	11	2	13
Total	106	47	153

III.—*Structural and functional diseases*—Continued.

D.—DISEASES OF THE RESPIRATORY ORGANS.

Diseases.	Regulars.	Volunteers.	Total.
Pharynx, disease of	19	14	33
Larynx, disease of	16	9	25
Coryza	15	11	26
Bronchitis:			
Acute	110	49	159
Chronic	50	47	97
Capillary	1	0	1
Asthma	21	14	35
Pulmonary hemorrhage	1	0	1
Pneumonia:			
Catarrhal	5	10	15
Croupous	80	40	120
Pleurisy	53	25	78
Other diseases of this class	11	4	15
Total	382	223	605

E.—DISEASES OF THE GENITO-URINARY SYSTEM.

Pyelitis	1	0	1
Nephritis:			
Acute parenchymatous	21	9	30
Chronic parenchymatous	15	15	30
Cystitis	18	8	26
Enuresis	1	0	1
Hematuria	2	0	2
Prostatitis	0	2	2
Urethral stricture	11	2	13
Paraphimosis	2	2	4
Phimosis	4	22	26
Varicocele	40	38	78
Hydrocele	2	7	9
Other diseases of this class	26	15	41
Total	143	120	263

F.—DISEASES OF THE LYMPHATIC SYSTEM AND DUCTLESS GLANDS.

Adenitis	2	14	16
Lymphangitis	2	1	3
Other diseases of this class	1	2	3
Total	5	17	22

G.—DISEASES OE THE MUSCLES, BONES, AND JOINTS.

Muscular rheumatism and myalgia	96	49	145
Whitlow	1	1	2
Osteitis	2	1	3
Periostitis	5	2	7
Arthritis	14	4	18
Chronic rheumatic	14	14	28
Bunion	1	0	1
Synovitis	6	13	19
Other diseases of this class	27	23	50
Total	166	107	273

H.—DISEASES OF THE INTEGUMENT AND SUBCUTANEOUS CONNECTIVE TISSUE.

Corns and warts	0	5	5
Ingrowing nails	19	7	26
Abscess	35	32	67
Furuncle	5	16	21
Carbuncle	0	1	1
Ulcer	20	34	54
Dermatitis from poisonous plants	3	9	12
Herpes	3	3	6
Eczema and pemphigus	6	8	14
Impetigo	1	1	2
Scabies	1	1	2
Other diseases of this class	1	0	1
Total	94	117	211

III.—*Structural and functional diseases*—Continued.

I.—DISEASES OF THE ORGANS OF SPECIAL SENSE.[1]

Diseases.	Regulars.	Volunteers.	Total.
DISEASES OF THE EYE.			
Lids, diseases of	0	2	2
Conjunctivitis:			
Acute	10	14	24
Chronic	3	2	5
Corneitis	0	2	2
Sclerotitis	4	0	4
Iritis	6	6	12
Retinitis	3	6	9
Asthenopia	1	0	1
Trachoma	2	1	3
Corneal ulcer	0	1	1
Opacities of the vitreous	0	1	1
Cataract	2	2	4
Optic neuritis	1	0	1
Corneal opacities	5	1	6
Total	37	41	78
DISEASES OF THE EAR.			
Diseases of the external ear	15	66	81
Diseases of the tympanum	1	1	2
Otitis media, suppurative	45	58	103
Deafness	2	4	6
Total	63	129	192
DISEASES OF THE NOSE.			
Nasal catarrh, chronic	3	0	3
Rhinitis	3	4	7
Total	6	4	10

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[1] The nosological index of diseases of the eye, ear, nose, and throat include only those to January 1, 1901. The index of these diseases which have occurred since January 1, 1901, will be found in the portion of this report upon the work done in the eye, ear, nose, and throat clinic.

IV.—*Accidents and injuries.*

A.—GENERAL INJURIES.

Disease.	Regulars.	Volunteers.	Total.
Burns and scalds	3	3	6
Exhaustion from disease	4	15	19
Insolation	23	15	38
Total	30	33	63

B.—INJURIES TO SPECIAL PARTS.

Contusions and sprains	37	26	63
Fractures	28	30	58
Hernia:			
Inguinal	80	60	140
Other	14	11	25
Orchitis, from injury	7	5	12
Wounds:			
Contused	8	7	15
Incised	11	8	19
Lacerated	17	9	26
Punctured	0	3	3
Gunshot	189	321	510
Other local injuries	6	2	8
Total	397	482	879

V.—*Unclassified.*

Disease or injury.	Regulars.	Volunteers.	Total.
Unknown	9	5	14
Convalescent	157	108	265
Total	166	113	279

From the consideration of the nosological index it will be seen that the diseases of the gastro-intestinal tract have furnished a very large percentage of the total number of patients admitted to the hospital. Next in frequency to those diseases come the malarial fevers, while the venereal diseases follow the malarial fevers in order of frequency.

Considered in the divisions as given in the Medical Manual, diseases of the digestive system stand first in order of frequency; infectious diseases, second; accidents and injuries, third; diseases of the respiratory organs, fourth; diseases of the nervous system, fifth; diseases of the muscles, bones, and joints, sixth; diseases of the genito-urinary system, seventh; diseases of the integument and subcutaneous connective tissue, eighth; diseases of the circulatory system, ninth; diseases of the ear, tenth; diseases of the eye, eleventh; diseases of general nutrition, twelfth; diseases of the nose, thirteenth.

Rate of mortality.—The total number of cases autopsied at this hospital since July 1, 1899, has been 252. The following table, compiled from 246 autopsy records, gives a good general idea of the rate of mortality of this hospital from the diseases mentioned. The deaths numbered under the diseases selected include all deaths from those diseases:

Cause of death.	Number of cases in hospital.	Number of deaths.	Mortality.
			Per cent.
Chronic dysentery, follicular, pseudo-diphtheritic ,gangrenous, and amœbic	1,634	113	6.9
Chronic enteritis	637	12	1.9
Pulmonary tuberculosis	223	40	18
Lobar pneumonia	120	24	20
Broncho-pneumonia	15	9	60
General miliary tuberculosis	5	5	100
Acute septicæmia	4	4	100
Empyema	40	4	10
Acute nephritis	30	5	16.66
Pernicious anæmia	5	5	100
Acute peritonitis	4	2	50
Acute menengitis	5	3	60
Chronic nephritis	30	3	10
Typhoid fever	207	4	1.9
Valvular disease of heart	65	4	6.15
Carcinoma	2	2	100
Pernicious malarial fever	3	2	66.66
Cerebral apoplexy	1	1	100
Cirrhosis of liver	1	1	100
Alcoholism	40	1	2.5
Fracture of skull	1	1	100
Primary tuberculosis of kidney	1	1	100

The consideration of this table shows several points of interest. The mortality rate of chronic dysentery, including all forms, has been low, despite the fact that many of these cases—in fact, the majority—came to the hospital very much debilitated from repeated attacks of dysentery, and in a large number of instances so weak and emaciated that no hopes were entertained of their recovery. The treatment of chronic dysentery at this hospital has varied considerably. In the amœbic cases, which have shown a very high percentage of recovery here, the treatment habitually used has been quinine injections. It has been found that under this form of treatment the amœbæ quickly disappeared from the stools in most instances, as well as blood and mucus, and recovery took place more or less rapidly. In a few instances quinine injections seemed to do no good, the amœbæ persisting, and most of these cases finally resulted in death. In the forms of dysentery other than amœbic the treatment by sulphate of sodium or magnesium sulphate has been used in the more acute cases with much success, and often in the chronic cases the treatment by magnesium sulphate has resulted in many cures. Injections of nitrate of silver have been used rather extensively and in many instances with good results. One of the greatest objections, however, to this method of treatment is the intense pain which the injections cause, and which, in some instances, has been so severe as to preclude their use. Bismuth subnitrate and opium have not been used to any great extent at this hospital in the treatment of dysentery.

One of the most difficult things in the treatment of cases of this kind is the diet. Some cases seem to be unable to take or absorb nourishment in any form. Quite a number of the recent albuminoid preparations have been tried, and in some instances have seemed to benefit the patient; but, as a rule, it has been found that peptonized milk acts fully as well as any of the proprietary preparations. In certain cases such preparations as "Tropon" and "Plasmon" have benefited patients who were unable to retain or absorb any other article of food; but these cases were rare and did not differ clinically from other cases which retained the ordinary articles of liquid diet. These preparations are undoubtedly useful in selected cases, but the majority of the patients to whom they were given expressed more or less dissatisfaction with them on account of their taste and mode of preparation and were better satisfied with the ordinary liquid diets. It is safe to say that the ideal diet for cases of chronic enteritis and dysentery is yet to be discovered.

Broncho-pneumonia.—The mortality was 60 per cent in broncho-pneumonia. It appears rather high, but if the class of cases in which this disease occurred be considered it will not be found to be so. All of the cases of broncho-pneumonia which have entered this hospital have followed measles, and it is a well-known fact that in such cases the mortality in adults is excessive. Nearly all of the cases developed after the infection of measles had apparently disappeared and were probably due to exposure brought about by the carelessness of the patient.

Lobar pneumonia.—Lobar pneumonia has shown a mortality of 20 per cent at this hospital. This is a very low mortality rate when the number of cases is considered in which an alcoholic history was obtained. Nearly 30 per cent of the cases which have occurred here gave a history of a prolonged alcoholic debauch just before the onset of the pneumonia, and about 40 per cent more gave a history of excessive use of alcohol at various periods of time, ranging from three months to a year or more. Most of the cases occurred in young men of very robust constitution, many of them being, if anything, overweight. In such cases where both the alcoholic history and the physical condition of the patient is against recovery, a very high mortality rate is to be expected. A mortality rate of 20 per cent at this hospital should therefore be considered remarkably low, considering the character of the cases, as in private practice, where the conditions are most favorable, the mortality rate of lobar pneumonia is generally estimated at 15 per cent and in hospital practice 25 per cent.

Pulmonary tuberculosis.—The mortality rate of pulmonary tuberculosis has been 18 per cent. This mortality rate, however, does not amount to very much, as most of the cases of pulmonary tuberculosis which could travel were sent almost immediately to Fort Bayard, N. Mex., for treatment, and only those who were unable to leave their beds have been retained in this hospital. It would be impossible to give a correct mortality in the cases of pulmonary tuberculosis which passed through this hospital without a knowledge of the history of the cases at Fort Bayard.

Pernicious malarial fever.—The mortality rate of 66.66 per cent in cases of pernicious malarial fever is rather high, but as only three cases have occurred at this hospital, and two of them were very obscure as regards to their symptomatology, it is hardly a fair estimate of the mortality rate in this disease, as, without doubt, had the cases been recognized sooner, the result might have been different.

As would have been expected, the mortality rate in miliary tuberculosis, acute septicæmia, pernicious anæmia, carcinoma, and cerebral apoplexy has been 100 per cent.

Empyema.—The mortality rate in empyema at this hospital has been 10 per cent. Nearly all the cases occurred as a sequela of pneumonia. Cultures made from the exudate in the fatal cases have shown as a rule streptococci and staphylococci. One of the four fatal cases gave a culture of the diplococcus pneumoniæ of Sternberg.

Acute nephritis.—The mortality rate in acute nephritis has been 16.66 per cent, which is rather high, but it should be remembered that in almost every case which has died from this disease, it has occurred as a complication of prolonged enteritis or dysentery. The patients, therefore, were very much depleted as regards their general condition and could not resist the inflammation of the kidneys. In almost every case dying of acute nephritis, it was found at autopsy that there had been a previous severe inflammation of some portion of the intestinal tract, most often of the ileum and a portion of the large intestine.

Typhoid fever.—The mortality rate of typhoid fever has been exceedingly low, being only 1.9 per cent. From a comparison of the mortality rates of this disease in various large hospitals throughout the country, it is believed that this is the lowest mortality rate, considering the large number of cases, which has ever been recorded. The treatment prescribed was that of cold baths and liquid diet, with an addition in some cases of intestinal antiseptics, such as salol and calomel. Treatment has differed in no way from that ordinarily prescribed at most of the large hospitals in this country, and it is probably true that careful nursing and the strong constitution of most of the patients contributed more to the successful results than the medical treatment.

Primary tuberculosis of the kidneys.—During the year one case has occurred of this very rare disease and this case proved fatal before any portion of the body was invaded by the infection. While tuberculosis of the kidney associated with tuberculosis of other organs, and secondary to infection in other organs, is of a very common occurrence, the primary involvement of the kidney and death following from that involvement before the infection has spread, is very rare. In this case both kidneys contained numerous tubercular abscesses and tubercules. The urine, before death, showed the presence of tubercle bacilli and of pus and blood. The patient had never presented any symptoms of tuberculosis of other organs and complained simply of some pain over the lumbar region, and of passing blood-stained urine. He died shortly after entering the hospital, from uremic poisoning. At autopsy the condition briefly described above was found in the kidneys, but no other organ in the body showed any trace of tubercular infection.

Certificates of disability.—An important function of the hospital has been the discharge of disabled soldiers on surgeon's certificate of disability. In the execution of the work, much of which was done at a time when there was urgent necessity for making room for incoming patients, great care has been taken to guard against the discharge of soldiers whose condition was such as to encourage the belief that they might be of future usefulness to the service, and in the case of volunteers that they might ultimately recover without permanent disability. The method was as follows:

The ward officers, after sufficient observation of the cases, made such recommendations respecting the disposition of the same as they thought indicated, upon a form for the purpose. A soldier recommended for such discharge was referred to a regular medical officer of experience, whose duty it was to carefully examine and observe him, and when satisfied that the disability was permanent, to have prepared under his supervision the necessary certificates, which were sent to the commanding officer for his action.

The frequent lack of notation in the descriptive list or other official papers of the manner of incurrence of the wound, injury, or disease that resulted in the disability, has been an annoying obstacle in the way of thoroughly satisfactory preparation of these certificates. In such cases, when impracticable to obtain the desired information from noninterested parties, it has often been necessary to rely on the sworn statement of the soldier himself.

During the fiscal year 951 soldiers were discharged on surgeon's certificate of disability. From the statement below, giving the number of discharges by months, it will be seen that the certificates of a large part of the 951 were made when transports were arriving at close intervals, bringing sick in large numbers, thus taxing to the utmost the capacity of the hospital and the energy of its personnel.

Month.	Regulars.	Volunteers.	Total.
July	31	24	55
August	34	55	89
September	36	56	92
October	93	35	128
November	78	41	119
December	80	26	106
January	64	30	94
February	35	45	80
March	30	43	73
April	34	18	52
May	27	4	31
June	18	14	32
Total	560	391	951

The following tabulated statement, arranged according to the Medical Manual, shows the cause of discharge for disability from July 1, 1900, to June 30, 1901:

Infectious diseases:	
Malarial cachexia	14
Pulmonary tuberculosis	20
Tubercular adenitis	4
Tubercular epididymitis	1
Syphilitic necrosis and abscess	4
Total	43
Diseases of the nervous system:	
Chorea	3
Neurasthenia	3
Epilepsy	15
Loss of memory	1
Neuritis, alcoholic	2
Osteo-myelitis	1
Locomotor ataxia	1
Paralysis, local and general	27
Neuritis	8
Morphine habit	2
Spinal sclerosis	2
Epileptiform convulsions	1
Tabes dorsalis	1
Cephalalgia	21
Melancholia	1
Total	89
Diseases of the digestive system:	
Chronic dysentery	31
Caries of teeth	37
Stricture of rectum	1
Deranged nutrition	4
Gastric dilatation	1
Gastro enteritis	12
Chronic diarrhea	15
Chronic gastritis	1
Chronic dyspepsia	1
Entero colitis	1
Disease of the liver	2
Chronic gastric ulcer	1
Chronic peritonitis	1
Hemorrhoids	2
Total	110
Circulatory system:	
Aortic insufficiency	6
Myocarditis	1
Phlebitis	9
Cardiac, valvular disease	21
Exophthalmic goiter	4
Tachycardiac arhythmia	18
Endocarditis	5
Varicocele	2
Varicose veins	3
Total	69
Respiratory organs:	
Asthma	14
Dyspnœa	3
Chronic pleurisy	5
Lung consolidation	2
Chronic laryngitis	1
Nasal catarrh	1
Total	26

Gunshot wounds and effects	248

Injuries:

Hands and arms	10
Ventral hernia	10
Inguinal hernia, refusing operation	44
Heat exhaustion	1
Flat foot	12
Knife wounds	15
Cataract	1
Periostitis	1
Chronic synovitis	7
Subluxation	4
Injury, feet	4
Fracture	39
Kyphosis	3
Necrosis	2
Ankylosis	4
Total	157

Diseases of the eye and ear:

Defective vision	58
Otitis media	104
Total	162

Disease of the muscles, bones, and joints:

Rheumatism	18
Psoas abscess	1
Local asphyxia	1
General muscular tremor and atrophy	2
Contraction palmar fascia, hand	1
Total	23

Genito-urinary organs:

Nephritis	6
Cystitis	2
Hydrocele	1
Urethral fistula	1
Total	10

Miscellaneous:

Hammer toe deformity	2
Abdominal tumor	1
Bunions of feet	6
Abdominal aneurism	1
Rectal prolapsus	1
Ischio-rectal abscess	1
Diabetes mellitus	1
Total	13

The following circulars regarding surgeon's certificates of disability have been published during the year:

"Hereafter, including to-day, each medical officer at this hospital having charge of wards will submit to the executive officer on or before 2 o'clock p. m. two sets of certificates of disability, commencing with the permanently disabled volunteers and such disabilities as are absolutely palpable, such as hernia, perforation of the drum, structural changes of the eye, or wounds.

"Whenever a medical officer finds his material for certificates exhausted he will, in place of certificates, submit a report to that effect to the executive officer in order that the commanding officer may make personal inspection with a view of possible detection of further cases suitable for discharge."

"The following instructions relative to the preparation of surgeons' certificates in cases of disability are necessitated, viz:

"1. The surgeons should carefully read the instructions on the blanks and comply with them.

"2. The first part should give the reason why a soldier is incapable of performing the duties of a soldier, and not a clinical history.

"3. An 'opinion' as to 'cause' of disability is required. This does not mean legal evidence, but an opinion formed from questioning the patient and weighing the value of his answers by other information obtainable, in the same manner as an opinion would be given in life insurance or accident policy.

"4. The question of whether incurred in line of duty is often difficult to answer.

"As a general rule it must be assumed that any disability was incurred in line of duty, unless it is clearly established that it existed prior to enlistment and was not discovered at that time, or was the result of the soldier's own unlawful act. Even then an aggravation due to the service resulting in disability would entitle the soldier to a certificate of 'In line of duty.'

"A disability contracted when on temporary absence, such as a pass, would be in line of duty, while if contracted on leave or furlough is not in line of duty.

"Careful attention should be paid to the degree of disability, and liberality may be exercised, as the degree in case of pension is fixed by the pension boards, and the opinion of the surgeon is not final.

"6. The certificates must be in the surgeon's own handwriting and should be written as legibly as possible."

EYE, EAR, NOSE, AND THROAT CLINIC.

On account of the large number of soldiers who present diseases of the eye, ear, nose, and throat, it has been necessary to establish a clinic in the hospital for the treatment of these diseases.

The work done in this clinic during the fiscal year is given below.

The total number of cases examined in the clinic during the six months since January 1, 1901, has been 501, divided as follows:

Regulars	264
Volunteers	214
Discharged soldiers	4
Civilians	19
Total	501
Total number of diseases of the eye	246
Total number of diseases of the ear	149
Total number of diseases of the nose and throat	132
Total diseases of all kinds	527

It will be noticed that the total number of these slightly exceeds that of the total number of cases examined, but this is explained by the fact that some cases present disease of more than one organ and have been counted in the list more than once.

DISEASES OF THE EYE.

The following is a nosological table of diseases of the eye which have been treated in the clinic since January 1, 1901:

Myopia	13
Hypermetropia	9
Compound myopic astigmatism	11
Compound hypermetropic astigmatism	6
Anisometropia	3
Convergent strabismus	3
Conjunctivitis:	
Simple	49
Membraneous	2
Gonorrheal	2
Granular—	
Acute	4
Chronic	13
Chemosis of conjunctiva	2

Chalazion	5
Blepharitis ciliaris	7
Ulcerative keratitis	2
Corneal opacities	16
Kerato-scleritis	2
Pterygium	9
Cataract:	
Traumatic	1
Senile	1
Incipient	1
Iritis:	
Rheumatic	2
Syphilitic	7
Sequel to variola	1
Vitreous opacities	2
Hemorrhage into the vitreous	1
Retinitis:	
Simplex	1
Proliferating	1
Pigmentosa	2
Hemorrhage into retina	1
Choroido retinitis	4
Choroiditis	7
Oedema of retina	1
Atrophy of optic nerve	5
Cellulitis, orbital	2
Dacryo-cystitis:	
Acute	2
Chronic	2
Stenosis nasal duct	1
Supraorbital neuralgia	2
Paralysis of ocular muscles	1
Abscess external canthus (from sting of insect)	1
Enucleation of eyeball	3
Malingering (vision)	36
Total	246

DISEASES OF THE EAR.

The following is a nosological table of diseases of the ear treated in the clinic since January 1, 1901:

Eczema external auditory canal	1
Furuncles external auditory canal	3
Impacted cerumen	10
Mastoiditis	3
Myringitis, acute	1
Tubal catarrh:	
Acute	5
Chronic	17
Otitis media:	
Nonsuppurativa, acuta	7
Suppurativa, acuta	22
Nonsuppurativa, chronica	15
Suppurativa, chronica	59
Malingering (hearing)	6
Total	149

DISEASES OF THE NOSE AND THROAT.

The following is a nosological table of diseases of the nose and throat treated in the clinic since January 1, 1901:

Eczema, nose	1
Deflection nasal septum	5
Nasal hemorrhage	2
Nasal polypus (sessile)	1

Rhinitis:	
Acute	10
Chronic hypertrophic	5
Syphilitic necrosis septum	2
Tonsillitis:	
Acute parenchymatous	3
Acute croupous	2
Follicular	2
Hypertrophy tonsils	7
Pharyngitis:	
Acute catarrhal	4
Chronic catarrhal	13
Syphilitic ulceration pharynx	1
Naso-pharyngitis:	
Acute	19
Chronic	33
Adenoids, pharyngeal vault	2
Laryngitis:	
Acute catarrhal	15
Tubercular	2
Syphilitic	1
Papilloma vocal chord	1
Paralysis vocal chord	1
Total	132

ETIOLOGY OF DISEASES OF EYE, EAR, NOSE, AND THROAT.

It is very difficult in most of these cases to state positively their etiology, on account of the imperfect histories given by the patients and that it can not be stated with certainty whether or not many of them were contracted prior to enlistment. In a few, however, it is possible to make a more decided statement in regard to the etiology.

Diseases of the eye.—The corneal opacities were in most instances due to gonorrheal conjunctivitis. Most cases of conjunctivitis and pterygium are undoubtedly due to the intense glare of the tropical sun. This factor also caused most of the cases of choroiditis and choroidoretinitis.

In cases giving a history of pernicious malarial fever, ophthalmoscopic examination has revealed deposits of pigment in the retina. In some instances the particles are so fine as not to interfere with the vision. In others the pigment is deposited in larger amount, resulting in diminished vision of 50 to 60 per cent.

The majority of cases of iritis were directly traceable to syphilitic infections. Most of these infections were contracted either in San Francisco, Honolulu, or Nagasaki; very few cases originating in the Philippines. The same can not be said, however, of the infections due to gonorrhea.

Malingering.—Among a certain class of soldiers the claiming of disability due to diseases of the eye or defect in vision is common. Many of these men realize how difficult it is without the proper facilities for intraocular examinations to detect the malingering. This is also true of claims for defect of vision, for without the use of test lenses and the ophthalmometer, it is often impossible to positively state whether there is a defect of vision or not, and even with these aids it often requires repeated examinations to detect the malingerer. The complete equipment of the eye clinic at this hospital has been of the utmost value in detecting malingering.

Disease of the ear.—Eczema and furunculosis of the external auditory canal are due, in a large proportion of the cases, to bathing in the filthy streams of the Philippines, which are laden with organic matter and human excrement. This is deposited in the external auditory canal and becomes decomposed owing to the heat and moisture of the climate and the unsanitary habits of the soldiers, giving rise to eczema and formation of furuncles.

Mastoiditis is due to the extension of the middle ear disease, a great many cases recovering without operation. The nonsuppurative form of otitis media has been found to be often due to the excessive use of quinine in cases suffering from malarial infection. The suppurative form of otitis media was almost invariably found to be a sequel of typhoid fever, measles, or variola.

Disease of the nose and throat.—The etiology of these diseases does not differ from the same diseases occurring in any other class of patients.

The prognosis and treatment of disease of the eye, ear, nose, and throat does not differ in the army from the same class of cases occurring in civilian life, save in unimportant particulars.

BACTERIOLOGICAL LABORATORY.

The report of the bacteriological laboratory, prepared by the pathologist of the hospital, is here inserted. During the year the blood and urine of every case entering the hospital has been examined, and in addition the fæces of every case diagnosed as chronic dysentery and the sputum of every case in which any lung symptoms were present. The following orders and circulars concerning the work of the laboratory have been issued during the year:

"All cases entering this hospital with a diagnosis of malarial fever, malarial cachexia, or in which malarial infection is suspected, should not have the blood examined until at least a week has elapsed after entry, unless active symptoms are present before that time. Quinine should not be administered to any such case until the blood has been examined and the diagnosis confirmed by the pathologist, except in pernicious cases, or where, for some complication, quinine is necessary."

"In cases of suspected tuberculosis, in which, even after repeated examination of the sputa, no tubercle bacilli are demonstrated, the ward officer should recommend transfer to Fort Bayard, provided the physical signs are sufficient to warrant the diagnosis."

"Cases with a diagnosis of malarial fever, in which the parasite is found in the blood, should be treated with quinine until all active symptoms have disappeared. Quinine should then be discontinued and nuclein given. An examination of the blood of all cases upon nuclein should be requested by the pathologist once a week, as long as this remedy is being administered. This is not imperative, and will only be complied with when there may be no detriment resulting from it for the patient."

"Circular No. 5 is modified to read that blood examination of new patients should first be made on bed cases, and in these cases repeated once a week, or oftener if necessary."

"The attention of the medical officers at this hospital is called to the large number of patients whose blood examination shows malarial parasites, but in which no clinical signs are present. Since August 20 there have been 15 such cases. As it is hardly probable that in so large a number there has been no rise of temperature during the twenty-four hours, it is recommended that when possible the temperature of all patients giving a history of malarial infection be recorded every twenty-four hours, as in the malarial fevers of tropical origin the morning and evening temperature can not be relied upon."

"The attention of medical officers of this hospital is called to circular No. 5, section 4, dated February 7, 1900. This paragraph is amended to read as follows:

"*Examination of fæces.*—The fæces of every case suffering from chronic dysentery or diarrhea, and having more than two bowel movements a day, will be submitted to the pathologist for examination at least once, and as often thereafter as he or the medical officer may direct. This examination is for the purpose of determining whether or no the amoeba coli is present, and, if so, that the proper treatment by quinine enemas be at once instituted."

"In case of death at this hospital the clerk in the officer of the day's room is to send a written notification to the pathologist as soon as possible."

"The card furnished to the pathologist should be filled out in every particular and attached to the body before it is sent to the morgue."

REPORT OF THE BACTERIOLOGICAL LABORATORY, UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO, SAN FRANCISCO, CAL., FOR THE FISCAL YEAR ENDING JUNE 30, 1901, BY CONTRACT SURG. CHARLES F. CRAIG, UNITED STATES ARMY, DIRECTOR OF THE LABORATORY.

I have the honor to submit the following report of the work done in the bacteriological laboratory of this hospital for the fiscal year ending June 30, 1901:

The total number of examinations made in the laboratory has been 15,260, which were divided as follows:

A. Examinations of blood	5,815
B. Examinations of urine	5,935
C. Examinations of sputa	1,251
D. Examinations of fæces	1,116
E. Examinations of post-mortem material	798
F. Miscellaneous examinations	345
Total examinations	15,260
G. Autopsies	163

(A) EXAMINATIONS OF BLOOD.

Five thousand eight hundred and fifteen specimens of blood were examined for the parasites of malarial fever, of which 643 were positive and 5,172 were negative. It will be noted that there is a very large negative result, which is due to the fact that every patient received in this hospital has an examination of the blood made, whether clinical symptoms of malaria are present or not. This practice has been of the utmost value, as by it over 150 cases of malaria were discovered which presented no symptoms of the disease at the time the blood was examined, but in which malarial parasites were found.

The 643 positive cases may be divided as to their etiology as follows:

Cases due to the benign tertian parasite	220
Cases due to the quartan parasite	3
Cases due to the estivo-autumnal parasites	400
Cases due to the tertian estivo-autumnal parasite	20

Tertian infections.—Two hundred and twenty specimens of blood contained the tertian parasite, of which 140 were single infections and 80 were double infections. There was nothing remarkable noticed about the tertian malarial parasite in soldiers returning from the Philippine Islands. As a rule, however, the infections were much more resistant than is the case in similar infections in this country. Many of these cases suffered relapses while in the hospital, although quinine was administered very conscientiously.

Quartan infections.—There were only three quartan infections found during the year, which agrees well with the known rarity of the quartan type of malarial infection.

Estivo-autumnal infections.—Four hundred specimens of blood showed the presence of the estivo-autumnal parasite. Of these 327 were due to the tertian estivo-autumnal parasite and 64 to the quotidian estivo-autumnal parasite. Nine cases were combined infections.

In the study of these parasites I have paid especial attention to the division between the tertian and quotidian forms, and careful study has only increased my conviction that two forms of the estivo-autumnal parasite exist, and can be differentiated both microscopically and clinically. This has not been the experience of most American observers, although the Italian schools have accepted these two divisions. As the morphological differences in the two parasites are not easily distinguished without some guide to their study, I shall here note briefly the structure of each and the diagnostic features of interest.

The quotidian estivo-autumnal parasite.—This form of malarial parasite completes its development in twenty-four hours as a rule. The parasite appears first as a very minute ring-shaped or round hyaline body, actively ameboid, within the red blood corpuscle. The outline of the organism is very indistinct, and were it not for its active ameboid movement it would be very easily overlooked. The ring form is usually perfectly circular when at rest, the center appearing of the same color as the corpuscle within which it lies. The organism is not very refractive and its outline is not sharply cut. When in motion it often appears triangular in shape, the movement consisting of a rapid waving motion of its border and the shooting out of minute protoplasmic prolongations, which are retracted almost as quickly as thrown out. The motion is not sluggish, but very rapid. Sometimes the ring form is lost, the organism becoming a pale hyaline disk. The movement is very erratic, and there are long periods of repose during which the ring form is retained. The organism is very small and never grows to occupy more than one-sixth of the corpuscle. The corpuscle containing the parasite is smaller than those surrounding it; presents a shrunken, wrinkled appearance, and is dark green in color. Often two or more parasites are seen within one corpuscle. There is no signet-ring appearance so common in the malignant tertian parasite. It is in this form of estivo-autumnal fever that the red corpuscles are most rapidly destroyed, and in pernicious cases almost every corpuscle in a microscopic field will be seen to contain a parasite. While the ameboid movement is not as constant as in the tertian parasite, it is more rapid and has to be watched for carefully.

The features to be noticed in the hyaline stage of the quotidian estivo-autumnal parasite are its minute size, never more than one-sixth the size of the red corpuscle; its indistinct outline; the rapidity of its movement. This stage is seen in the circulating blood best during or immediately after a paroxysm.

The pigmented stage.—Just prior to pigmentation the parasite becomes a little larger, loses its ring form, and becomes more refractive and sharply defined, but not as much so as in the malignant tertian parasite. In this parasite I have never observed a pigmented ring, the rule being that before pigmentation the ring form is lost. The pigment appears as a single, or at the most, two granules, either in the center or at one side of the parasite, and is always perfectly motionless. Sometimes the pigment appears as a rather coarse, irregular block, situated in the center of the parasite, and I have considered such an appearance as denoting the approach of a segmentation. The infected corpuscle is always shrunken, greenish in color, and often crenated. Often, also, the hemoglobin seems to have retacted around the parasite. At this stage it is never more than one-fourth the size of the corpuscle. The chief points of interest at this stage are loss of ring form before pigmentation, lack of motion of pigment granules, and changes in the infected corpuscle. Pigmented forms are by no means rare in the circulating blood and are most numerous just before or during a paroxysm. The pigment is dark red or black in color. Ameboid motion is lost.

The segmenting stage.—This stage is rarely observed in the circulating blood. I have only observed segmenting bodies three times in over 100 cases of quotidian estivo-autumnal fever, and only in the pernicious type. In blood from the spleen, or in smears from that organ taken after death, segmenting forms are common. In the parasite which has become pigmented little change is noticed prior to the segmentation, save that the pigment is collected in a solid block at the center of the organism, while its protoplasm has become very finely granular in appearance. The pigment may be situated at one side, and the parasite is always round or oval in shape. As segmentation commences, faint radial striations can be detected starting from the center, and soon the organism breaks up into from six to eight minute, round, or oval segments. Marguerite forms are rare, irregular segmenting forms being the rule. A peculiarity of the process of segmentation in this form of the parasite is that it occurs generally inside of the red corpuscle before its entire destruction. In all of the cases in which I have observed segmenting forms in the circulating blood, segmentation had occurred within the corpuscles, and this is one of the characteristic phenomena observed in the life cycle of the quotidian estivo-autumnal parasite. The segmenting bodies are most common just before or during a paroxysm. The chief points of interest at this stage are the granular appearance of the parasite, the occurrence of segmentation within the red corpuscles, and the small number of segments.

The tertian estivo-autumnal parasite.—This is the most common parasite associated with estivo-autumnal fever, and is the one that has been the most studied and is the best known.

The hyaline stage.—Like the quotidian parasite, the first stage in the development of the tertian organism consists of a round hyaline ring or disk, but several important differences are to be noted, i. e., the ring is larger, being from one-third to one-fourth the size of the corpuscle. It is irregular, presenting an enlargement at some portion of its circumference, giving it the so-called "signet ring" appearance. It is highly refractive and is sharply cut, looking as though it had been punched out of the corpuscle; its protoplasm is clear and homogeneous; its ameboid movements slow and sluggish as compared with the quotidian parasite. The ring form is often lost, a clear hyaline disk resulting. The changes in outline are very marked, and it is much easier recognized than is the quotidian parasite. Only very rarely does more than one organism invade a single corpuscle, which is common in the quotidian form. The infected corpuscle is greenish in color and smaller, but it is not so markedly affected as in the quotidian.

The pigmented stage.—In the course of twenty to twenty-four hours, during which time the hyaline body has been ameboid, a few fine pigment granules make their appearance within the ring, generally in the enlarged area at one portion of its circumference, thus giving the organism a still greater resemblance to the signet ring; the ameboid movement continues and the pigment granules are often seen to be in a rapid vibratory motion. The pigment is reddish in color and is present in larger amount than in the quotidian parasite. The organism gradually loses its ring form and becomes larger, sometimes occupying one-half of the corpuscle. At the same time it becomes more clearly defined, its protoplasm more refractive and faintly granular in appearance. The ameboid motion still continues, though very sluggishly, and the pigment tends to collect in a solid block, which has a marked vibratory movement. The pigmented form is somewhat rare in the circulating blood, but blood from the spleen will show great numbers of them. The chief points of interest are appearance of pigment in the ring form, sharply-cut outline and granular protoplasm, motility of the pigment granules, and larger size.

The segmenting stage.—In about forty-eight hours the parasite has grown to be one-half to two-thirds as large as the red corpuscle; the pigment has become motionless and collected in a block near the center, and distinct radial striations are visible. The segments are larger than those of the quotidian organism, are more oval in shape, and number from ten to fifteen, or more. The segmentation usually occurs outside of the corpuscle. I have observed segmenting bodies but once in the peripheral circulation. The parasite is very refractive, sharply outlined, and the protoplasm is granular.

One of the most characteristic features of the malignant tertian parasite, after the ring form has been lost, is the peculiar refractive, finely granular appearance of the protoplasm, resembling very closely that of the crescents. The pigment is also in finer particles and there are more of them.

Crescentic forms of the estivo-autumnal parasite.—Crescents are developed in the life cycle of both varieties of the estivo-autumnal parasite, and their morphology differs in a few particulars. The tertian estivo-autumnal crescent is large, very slender, with pointed extremities, very refractive, and seldom shows a double outline. Its protoplasm is finely granular, and the pigment large in amount and in the form of slender rods.

The quotidian estivo-autumnal crescent is much shorter and plumper than is the tertian, sometimes being very small. Its extremities are never pointed, but instead are rounded, and it always presents a distinct double outline. The protoplasm is less granular, and in the inclosed pigment is smaller in amount and is in the form of dots.

Presence of the quotidian parasite in the blood in relation to the attack.—During the acme of the elevation of the temperature and the sweating stage the small ameboid parasites are found in the blood within the red corpuscles. The number of the infected corpuscles vary greatly, some cases showing only one or two in the whole specimen, while in others every microscopic field will show several. At this stage the parasites are always unpigmented and often show no ameboid motion for longer or shorter periods of time.

During the afebrile stage the blood will show, besides the ring forms, a few, or many, as the case may be, of small pigmented bodies, generally circular in shape and containing one or two small pigment dots.

Just before the onset of the paroxysm, and often during the initial rise of the fever, larger pigmented forms are present, the pigment generally being collected near the center of the parasite, while the infected corpuscles are very brassy in appearance. The segmenting forms, as has been noted, are only very rarely seen in the circulating blood. In typical cases of quotidian estivo-autumnal fever, or where there is an infection with more than one group of parasites, the presence of the various forms in the blood become irregular or hyaline, and the pigmented forms may be observed at almost any time; but there will always be found a greater number of forms which correspond to the stage of the disease as shown by the clinical chart, and often in a double infection only a very few parasites belonging to one group will be seen, while there are multitudes belonging to the other group present, and it will invariably be found that it is not the most numerous group which is responsible for the clinical symptoms present.

It is this form of the estivo-autumnal parasite which is most often found in the pernicious form of the disease, but it is rare when compared to the form to be described next. The great majority of the cases of remittent malaria occurring in our soldiers in Cuba, and, so far as I have observed, in those returning from the Philippines, are caused by the malignant tertian form of the parasite, but now and again a pure case of quotidian fever will present itself, and the characteristic parasite can always be demonstrated when quinine has not been administered.

Presence of the tertian estivo-autumnal parasite in the blood in relation to the attack.—During the acme of the temperature and until the afebrile stage is reached, the small nonpigmented hyaline ameboid ring forms or disks are found in the circulating blood, with occasionally, at the acme of the fever, a larger pigmented body.

During the afebrile stage the ring forms gradually develop pigment, and the nearer the time of the onset of the paroxysm approaches the larger and more numerous do the pigmented forms become. Just before the paroxysm the blood will probably show a few pigmented forms occupying from one-half to two-thirds of the corpuscle, which is brassy in color, the hemoglobin often being retracted around the parasite. The pigment in such parasites is usually collected at the center and is immotile. Often at the commencement of a paroxysm the blood from the ear or finger will show no parasites and but a few pigmented leucocytes. However, if the blood be examined when the attack is at its height—i. e., when the fever is highest—numerous ring forms will be found. Although segmenting forms can be readily found at the onset of the paroxysm in blood from the spleen, they very rarely occur in blood taken from the ear or finger. Very many cases, both of the quotidian and tertian estivo-autumnal fevers, will be found which show at most but very few of the pigmented parasites in the peripheral blood, and often, though a few ring forms can always be found, provided they are looked for at the proper time and the examination persisted in. Nowhere does one discover the fact that "patience is a virtue" more quickly than in examining the blood of cases of estivo-autumnal fever. Often a half hour will be spent before a parasite is found, though in the majority of cases so long a search is not necessary. In estivo-autumnal fever the parasites are always most numerous during the apyrexial stage, but there are often seen mild cases of the disease in which only after tedious and repeated examinations of the blood will the parasite be found. In such cases pigmented leucocytes are almost always present, and it is justifiable to make the diagnosis of malaria from them alone.

Differentiation of the tertian and quotidian estivo-autumnal parasites.—Marchiafava and Bignami, in differentiating the tertian and quotidian parasites, call attention to the following:

1. Duration of the life cycle, twenty-four hours in the quotidian, forty-eight hours in the tertian parasite.
2. Pigmentation, greater in the tertian; the pigment motile.
3. Size of parasite, greater in the tertian.
4. Ameboid motion, more marked in tertian and longer preserved.
5. Relation of the various forms to the life cycle.

In my researches I have confirmed most of Marchiafava and Bignami's conclusions, and in the numerous cases of both varieties of estivo-autumnal fever studied have, I believe, been able to trace marked differences in every developmental stage of the parasites. I have already referred to these differences, but will recapitulate them here:

1. The hyaline stage.—The tertian estivo-autumnal parasite is larger, more clearly cut and refractive, and has a more sluggish ameboid motion than the quotidian parasite. It has often a signet ring shape, while the quotidian is perfectly round. Only one parasite is found, as a rule, in a corpuscle in a tertian infection, while in the quotidian two or more are common. The infected corpuscle is less crenated and lighter in color when infected by the tertian parasite.

2. The pigmented stage.—The tertian parasite is larger and pigmentation occurs while the ring form is still retained. In the quotidian the ring form is never pigmented. Ameboid motion is present after pigmentation, while in the quotidian it is always lost before pigmentation occurs. The tertian parasite is more sharply defined and the pigment present in larger amount is finer and is motile, while in the quotidian the pigment is always motionless and consists of one or two coarse granules. Only one pigmented tertian occurs in a corpuscle, while two or more quotidian parasites may be present in one corpuscle. The infected corpuscle is more crenated and brassy when infected by the quotidian parasite.

3. The segmenting stage.—The number of segments is greater in the tertian and the segments are more oval in outline and larger. Segmentation occurs outside the red corpuscle in the tertian estivo-autumnal parasite, while in the quotidian it occurs within the infected corpuscle.

4. The crescentic stage.—The tertian crescents are longer and more narrow than the quotidian, are more deeply pigmented, and have less of a double outline. The protoplasm of the tertian crescent is more refractive and granular in appearance.

5. The flagellated stage.—In the tertian parasite, both forms of flagellate bodies heretofore described are larger and more deeply pigmented than in the quotidian.

6. The cycle of development.—Twenty-four hours completes the cycle of development within the human body in the quotidian parasite. Forty-eight hours in the tertian.

When we add to these numerous morphological differences the typical clinical phenomena exhibited by these parasites, it must, I think, be admitted that there are at least two varieties of the estivo-autumnal parasite, a tertian and quotidian, and from my own observations I can arrive at no other conclusion.

It may be urged that the differences noted may be due to special conditions of environment, or unusual factors affecting the health of the individual, etc., and while, of course, we are unable to prove that this may not be so, yet they are so constant and harmonious that it is impossible to believe that they are accidental, and until such theories can be proven, I shall continue to believe that the estivo-autumnal malarial parasites are divided into at least two varieties, the quotidian and tertian parasite. In the examination of the blood of patients returning from the Philippine Islands who have previously suffered from malarial fever, the marked anæmia which most of them show is very noticeable. This condition is strictly a post-malarial one, due to the destruction of the blood corpuscle by the malarial parasite. Blood counts have been made of most of these cases as well as microscopical examinations. The reduction in the number of red corpuscles has been found to be, as a rule, very marked, many of the patients showing but 500,000 to 1,000,000 red cells per cubic millimeter. In the estivo-autumnal malaria the anæmia produced by repeated attacks may be extreme and also very persistent, while, unlike the tertian and quartan forms, the regeneration of the red cells occurs very slowly. The lowest number of red corpuscles to the cubic millimeter which I have observed at this hospital has been 435,000 and the patient in this case recovered and was returned to duty in six weeks. There have been five cases of pernicious anæmia following malaria observed at this hospital in which the result was fatal. In all these cases an examination of the blood showed a marked reduction in the number of the red corpuscles and many of the corpuscles were deformed but no nucleated red cells were observed. The reduction in the hæmaglobin was equal in ratio to the reduction in the number of the red cells. The white cells were reduced in number but the large mononuclear were increased in number. At the time of the paroxysm an apparent leucocytosis is often noticed, but this is only apparent, for, as a rule, the white cells are reduced in number. A real leucocytosis is generally an indication of the presence of some complication.

As shown by the fatal cases of post-malarial anæmia which have occurred at this hospital, the anæmia following estivo-autumnal attacks is not always benign. Two forms of pernicious anæmia following malaria have been described by Bignami, Bastianelli, and Dionisi:

I. A form resembling in its clinical symptoms, blood findings, and pathology, the classical type of pernicious anæmia. In this form the blood shows poikilocytosis, the presence of microcytes, abnormal state of red corpuscles and nucleated red cells usually megaloblastas.

II. The second form is more interesting, for while it is generally fatal the blood does not show any nucleated red cells. This lack of nucleated red cells is probably due to the almost complete absence of regenerative power in the blood-forming organs, and the condition is similar to that found after profuse hemorrhage of any cause.

The cases of fatal pernicious anæmia following malaria observed here have been of the latter type, none of them showing nucleated red cells in the blood, the chief pathological feature being the marked reduction in the number of red corpuscles. This reduction has been very great in the cases observed here, ranging from 450,000 to 600,000 red cells per cubic millimeter before death occurred. Leucocytes were decreased in number, but there was often noticed an increase in the eosinophiles. The blood in these cases showed but a very slight degree of poikilocytosis, but there was a great difference in the size of the cells.

The post-mortem findings in cases of pernicious anæmia following malaria have been so similar as to be almost characteristic of this disease. The bodies were not greatly emaciated, the skin being of a yellowish hue; rigor mortis slight; the subcutaneous fat and muscular tissue well preserved. All of the cases showed an increase in fatty tissue throughout the body. The organs, as a rule, presented a very anæmic appearance, the kidneys usually being in a condition of subacute parenchymatous nephritis. The liver presented invariably a condition of fatty degeneration, and the lungs were œdematous. In several cases there was pleurisy with effusion in one or both of the pleural cavities. The amount of fat around the organs and in the greater omentum was very noticeable, but the most characteristic change present was found in the pancreas. In every case the pancreas was very markedly hypertrophied and almost white in color. The consistence of the organ was much increased and upon microscopical examination this was found to be due to the marked increase in the connective tissue of the organ. Invariably the pancreas was found surrounded by a large amount of fat. The spleen was always found enlarged, the parenchyma pigmented and greatly decreased in consistence. As a rule, the heart was found to be undergoing fatty degeneration. In all the cases the blood was found to clot very slowly and the color varied from a slight red to a yellowish red.

Microscopical examination of sections from the organs in these cases showed nothing very characteristic, save the increase in the connective tissue of the pancreas which has already been spoken of. The heart muscle showed a slight fatty degeneration in every case. The kidneys were generally found in a condition of subacute parenchymatous nephritis. The liver showed a profuse fatty degeneration, and the spleen the usual condition found in chronic malarial poisoning, i. e., marked pigmentation; the presence of a few parasites, and venous congestion of the splenic sinuses.

In all the cases dying from pernicious anæmia following malaria, the most heroic treatment failed to produce an increase in the red blood corpuscles, the patient steadily declining in strength until the fatal issue. It is impossible to say, however, whether or no a case of anæmia following malaria will be pernicious, as I have observed a large number of cases which presented very low blood counts and all the typical symptoms of the pernicious form, but which recovered under proper treatment. The prognosis, therefore, is generally good, the blood regaining its normal number of red cells in weeks or months, even after a marked reduction in number. The prognosis in a case which assumes the pernicious type is very grave, death soon occurring. The most marked reduction in number, however, is no index of the final outcome of the anæmia and should not be considered as discouraging.

Latent and masked malarial fever.—A routine examination of the blood in every case ntering this hospital has demonstrated that a considerable portion of cases of malaria hich have been contracted in the Philippines, present no definite symptoms, or the ymptoms are masked by those of some other disease. The subject of latent and asked malarial fever has not received the attention which it deserves. If such a ing could be possible as a microscopical examination of the blood in all the cases f disease, in all parts of the world, it is safe to say that the number of cases due to e presence in the blood of the malarial parasites would be so surprising as to be lmost unbelievable.

In the latent and masked malaria are included all the cases in which the parasite ay be demonstrated in the blood, but in which no clinical symptoms are present, r the symptoms present are not those typical of malarial infections. A still closer efinition of the terms "latent and masked" may be made as follows:

The latent malarial fevers are those in which the parasites may be demonstrated n the blood, but in which no clinical symptoms of any disease are present.

The masked malarial fevers are those in which the parasites may be demonstrated n the blood, but in which the symptoms present are those of some other disease, r are atypical.

In the first class are included those cases in which the disease is discovered accidentally through the examination of the blood as a matter of routine practice or ome other purpose. Such cases have shown absolutely no symptoms of malaria, et the parasites pursue their life cycle in the blood, but in small numbers. These ases have been rather numerous in my experience in the examination of the blood n soldiers returning from the Tropics. As a rule in such cases the parasites are few n number, but there is generally a great deal of pigment present and numerous pigmented leucocytes. The tertian estivo-autumnal parasite is the one most commonly ound in this class of infection, but the quotidian form is by no means rare.

The only explanation of the fact that the development of the malarial parasites in he blood may not, for a considerable length of time, be accompanied by clinical ymtoms of the disease is that they are so few in number that comparatively little f the malarial poison is produced, or else that the infected individual is very resistant to the action of the poison.

The length of time during which such latent infection may exist is not yet determined, but I have no doubt that in some cases it may be for weeks. As proof of his I have records of one case in which estivo-autumnal parasites were found in the lood for six weeks before the paroxysm occurred, repeated blood examinations eing made during that time. I have records of many cases in which the parasites were found for from seven to fourteen days before clinical symptoms appeared.

The masked form of malarial infection is much more common than the latent form, and its recognition is very important from a practical point of view. Such cases have often presented no rise of temperature, and in fact the temperature is often subnormal. Nervous symptoms, such as slight headache, vertigo, neuralgia of various parts of the body, etc., or symptoms referable to some other disease may be present. The most common disease which masked malarial fever presents in soldiers returning from the Philippine Islands are acute and chronic enteritis, chronic dysentery, and tuberculosis. During the past year I have kept a record of all cases in which the malarial parasites were found in the blood, but in which no clinical symptoms were present, or the symptoms present were those of some other disease. None of these cases were diagnosed as malaria, and in many instances the prompt institution of treatment by quinine resulted in the cure of the cases which were supposed to have been due to other causes.

The total number of cases in which the malarial parasites were demonstrated, but no diagnosis of malaria made, was 172. These cases may be divided as follows:

Tertian infections	36
Estivo-autumnal infections	131
Quartan infections	1
Combined infections	4

Tertian infections.—In all the tertian infections the parasites were found undergoing their normal life cycle within the peripheral blood. The diagnoses of these cases before the blood examination, as entered upon the pathological blank, were as follows:

Chronic dysentery	12	Articular rheumatism	1
Chronic diarrhea	2	Hernia	1
Wounds	2	Acute constipation	1
Gastro-enteritis	1	Appendicitis	1
Fractures	1	Retinitis	1
Pulmonary tuberculosis	1	No diagnosis	11
Acute bronchitis	1		

From the foregoing it will be seen that chronic dysentery was the most common diagnosis made in these cases, and in most instances the patients suffered from considerable diarrhea, but in two-thirds of them treatment by quinine not only caused the disappearance of the parasites, but also cured the diarrhea. The cases in which no diagnosis was made were all cases of latent infection, the patients presenting no symptoms referable to any disease. It is probable that they had suffered from malaria in the Philippines, but under treatment had improved, and were transferred to the United States because of their debilitated condition.

Estivo-autumnal infections.—The estivo-autumnal infections, numbering 131 cases, were diagnosed as follows:

Chronic dysentery	43
Chronic diarrhea	15
Pulmonary tuberculosis	8
Wounds	3
Chronic gastritis	3
Hernia	2
Syphilis	2
Otitis-media	2
Acute melancholia	2
Asthma	1
Fractures	1
Pneumonia	1
Cellulitis	1
Chronic dyspepsia	1
Tachycardia	1
Paralysis	1
Insanity	1
Acute pharyngitis	1
Dipsomania	1
Furuncle	1
Rheumatism	1
Chronic nephritis	1
Uraemia	1
Varicocele	1
General debility	1
Acute bronchitis	1
No diagnosis	34

These 131 cases of estivo-autumnal fever may be divided, as regards their etiology, as follows:

Tertian estivo-autumnal infections	102
Quotidian estivo-autumnal infections	29

The tertian estivo-autumnal cases were divided as follows:

Chronic dysentery	35
Chronic diarrhea	12
Pulmonary tuberculosis	3
Wounds	3
Acute melancholia	2
Chronic gastritis	2
General debility	1
Insanity	1
Syphilis	1
Otitis-media	1
Appendicitis	1
Dipsomania	1
Rheumatism	1
Fracture	1
Chronic nephritis	1
Furuncle	1
Cellulitis	1
Acute bronchitis	1
Pneumonia	1
Paralysis	1
Chronic dyspepsia	1
No diagnosis	30

The quotidian estivo-autumnal infections were diagnosed as follows:

Chronic dysentery	8
Pulmonary tuberculosis	5
Chronic diarrhea	3
Chronic gastritis	1
Asthma	1
Acute pharyngitis	1
Furuncle	1
Otitis-media	1
Uræmia	1
Syphilis	1
Tachycardia	1
No diagnosis	5

The quartan infections.—There was one case which showed the presence in the blood of the quartan parasite. This case was diagnosed as chronic dysentery.

Combined infections.—There were four cases of combined tertian and estivo-autumnal malaria, all of which were diagnosed as chronic dysentery.

From the consideration of these cases in which the malarial parasites were found in the blood, but in which it was impossible to diagnose the infection, it will be seen that the diagnosis of chronic dysentery was altogether the most common. This was probably due largely to the fact that many of these cases were suffering from chronic dysentery and malaria as a complication, but it should not be forgotten that many cases of pure malaria present symptoms which are referable to the intestinal tract, such as diarrhea, indigestion, etc., and the fact that many of these cases recovered under quinine, even from the intestinal complication, conclusively proves that this is the case. In my opinion every case of diarrhea or dysentery should have a blood examination for the parasites of malarial fever.

The diagnosis of pulmonary tuberculosis in these cases was in every instance due o the emaciated condition of the patient and the rise in temperature which resembled hat of the disease in question. It will be seen that of the thirteen cases so diagnosed eight were due to the tertian estivo-autumnal parasite and five to the quotidian parasite. The administration of quinine in these cases resulted in complete recovery. Here again the importance of the examination of the blood in cases of suspected pulmonary tuberculosis is manifest.

The most important lesson taught from this large number of cases in which malaria was not suspected is the importance of examining the blood of every case of disease arising in the Tropics and how little faith can be placed in the clinical symptoms which may be present. While many of these cases were complicated by the disease which was diagnosed, it was invariably found that the termination of the malarial infection by treatment with quinine resulted in a general improvement of the condition present.

An interesting fact shown by the examination of blood at this hospital has been the occurrence together of the parasites of malarial fever and the amœbæ of dysentery. Of the cases which were diagnosed as chronic dysentery and proved to be infected with the malarial parasites, 10 per cent showed the amœbæ of dysentery in the fæces.

Reference to the table will show that a great majority of the cases of latent and masked malarial fever were infected by the estivo-autumnal parasite. This fact is of the greatest importance, as it demonstrates how this fatal type of malarial parasite may be present without producing any definite clinical symptoms. In such cases it is very important to recognize the presence of this organism in soldiers campaigning in the Tropics under many climatic and sanitary conditions which deplete the strength and render the individual more susceptible to disease. The presence of this parasite in the blood should always be considered as a serious matter, for it may at any time begin to multiply rapidly and give rise to pernicious symptoms. The microscopical examination of the blood enables us to recognize its presence ofttimes when it is not suspected, and this enables us to apply the proper treatment with the greatest chance of success and with the least discomfort to the patient.

Widal test.—There were comparatively few Widal tests made during the year, as there has been no epidemic of typhoid fever in the camps here, nor do we receive many cases from the Philippines. There were 110 tests made in all, of which only 9 proved positive. Of these 9 positive cases, 4 were patients returning from the Philippine Islands, and the remaining 5 were patients received from the recruit camp.

Estimation as to number of red blood corpuscles.—There have been 168 blood counts made during the year in cases suffering from anæmia. Many of these counts have shown a very great reduction in the number of red cells, a large number being below 1,000,000 red cells per cubic millimeter, and one case showed only 420,000 red cells to the cubic millimeter before death. Most of these low blood counts were in cases suffering from anæmia secondary to other diseases, such as dysentery, malaria, and typhoid fever. Only three cases of typical pernicious anæmia occurred during the year.

(B) EXAMINATIONS OF URINE.

During the year 5,935 specimens of urine were examined chemically and microscopically. It has been the rule to examine the sediment of every urine microscopically, whether or no albumen was present. This has been rendered possible by the installation in the laboratory of an electric centrifuge. The results obtained by the examination of the urine are as follows:

	Cases.
Albumen was found in	845
Pus in	431
Blood in	68
Casts in	338
Sugar in	34
Spermatozoa in	23

Examination of urine for effect of anæsthetics.—During the year a careful record has been kept of the results of the examination of the urine of cases operated upon at this hospital under anæsthesia. The method of obtaining these results is as follows: An examination of the urine is made just before the operation. Immediately after the operation the urine is drawn by a catheter and examined. In those cases in which the urine showed an abnormal condition it was examined every twenty-four hours until it became normal.

One hundred and fifty-six specimens of urine were thus examined for the effect of anæsthetics, with the following results:

	Cases.
Albumen was found in	14
Hyaline casts in	3
Granular casts in	5
Granular and hyaline casts in	3
Granular and epithelial casts in	3
Hyaline and epithelial casts in	1
Normal	127

In all the cases the urine showed a marked increase in specific gravity.

The anæsthetic used has been almost invariably chloroform, although ether has been used in a few cases. Those cases in which ether was used showed no abnormal condition of the urine after operation, beyond an increase in specific gravity.

The urine of all cases which showed albumen or casts became normal in a few days, thus showing that the effect of the anæsthetic was transitory.

From the above results it will be seen that in ordinary surgical work the effect upon the kidneys of chloroform is not of great importance. While chloroform undoubtedly may cause an acute congestion of the kidney, this congestion is only temporary and speedily passes away without leaving, so far as can be seen, any permanent disability. A large number of chemical examinations were made in these urines to determine the relative amounts of chlorides, sulphates, phosphates, and urea present after the administration of the anæsthetic. The results obtained have been so contradictory, however, that they are of no scientific value, although the excretion of urea was found to be almost invariably increased.

Examinations of urine for the bacillus of tuberculosis.—There have been eight specimens of urine examined for the bacillus of tuberculosis, only one of which proved positive. In this specimen the bacilli were very numerous and the autopsy showed a marked tuberculosis of the testicle, prostate, and neck of the bladder.

(C) EXAMINATIONS OF SPUTA.

During the year 1,082 specimens of sputa were stained and examined for the bacillus of tuberculosis, with a positive result in 169 cases. It has been found that in many instances the sputa of patients returning from the Philippines contains so very few bacilli that repeated examinations are necessary before they can be demonstrated. Accordingly, an order was issued requiring at least six sputa examinations in cases of suspected tuberculosis before a case could be considered negative. This order has resulted in the demonstration of the bacilli in quite a number of cases in which from two to four examinations had been negative. It has also caused a very large negative result in the total number of sputa examinations.

(D) EXAMINATIONS OF FÆCES.

During the year 1,116 specimens of fæces were examined for the amœba of dysentery with a positive result in 223 cases. In my report of last year I stated that of 313 examinations of fæces only 8 showed the presence of the amœba. It will be seen that this year the number of cases showing the amœba is very much larger and is probably explained by the large number of United States volunteers who were returned during the year to be mustered out, who would otherwise have remained on duty in the Philippine Islands, even though suffering from attacks of amœbic dysentery. It is a well-known fact that cases suffering from this disease often recover sufficiently to return to duty, even though this recovery is, as a rule, followed by a relapse.

The large percentage of amœbic dysentery found in the Philippines, and which did not agree with the results obtained at this hospital, is undoubtedly very largely explained by the fact that the greater number of cases of amœbic dysentery were not returned to the United States immediately, but only after two or more attacks. This was especially true in the case of volunteers, many of whom, although suffering from relapses of this disease, were able in the intervals to do duty. When, therefore, these men were returned to be mustered out according to law, the percentage of amœbic dysentery found at this hospital was greatly increased.

Another feature which undoubtedly appears in lowering the percentage in which amœbæ are present in the fæces, as compared with the results obtained in the Philippines, is that during the passage across the Pacific many of the cases recovered apparently under a change of climate and medical treatment, and when they reached this hospital were having the normal number of bowel movements, with no evidence of dysentery. Such cases were examined, and if thought able to do duty were immediately transferred to the camps at the Presidio, and were never entered at this hospital as patients.

There have been a few fatal cases diagnosed as amœbic dysentery observed at this hospital in which the amœbæ were present in the fæces, but which upon autopsy were found to present no evidence of the disease. These cases will be referred to more fully in another section of this report.

Cercomonas intestinalis was present in the fæces of 30 cases diagnosed as chronic dysentery. They were almost invariably accompanied by the amœbæ. In only one case were tænia segments observed. In no case was the anchylostoma duodenalis found.

(E) EXAMINATIONS OF POST-MORTEM MATERIAL.

There were 163 autopsies performed at this hospital during the year, and in all these cases sections of the viscera were prepared and stained. In all, 798 sections have been prepared. The following is the cause of death in the cases autopsied:

	Cases.
Chronic dysentery (follicular 18, diphtheritic 30, gangrenous 2, amœbic 23)	73
Pulmonary tuberculosis	22
Lobar pneumonia	19
Chronic enteritis	7
Broncho-pneumonia	6
General miliary tuberculosis	5
Acute septicæmia	4
Empyema	4
Acute nephritis	4
Pernicious anæmia	3
Acute peritonitis	2
Acute meningitis	2
Chronic nephritis	2
Enteric fever	2
Valvular disease of the heart	2
Chronic colitis	2
Carcinoma of larynx	1
Pernicious malarial fever	1
Cerebral apoplexy	1

In order to obtain a comprehensive view of the complications which have accompanied the disease causing the greatest number of deaths at this hospital, I have prepared the following table, showing the cause of death and the complications observed:

Cause of death.	Number of cases.	Complications.
Chronic dysentery:		
Follicular	18	Acute nephritis, 7 cases; chronic enteritis, 11; chronic gastritis, 6; fatty degeneration of the liver, 6; chronic pleurisy, 5; chronic nephritis, 3; venous congestion of liver, 3; lobar pneumonia, 3; arteriosclerosis, 3; acute pericarditis, 2; chronic bronchitis, 2; subacute parenchymatous nephritis, 3; lobar pneumonia, 3; infarcts of lung, 2; cirrhosis of spleen, 2; cirrhosis of liver, 1; infarcts of spleen, 1; pulmonary tuberculosis, 1.
Diphtheritic	30	Chronic enteritis, 24; chronic gastritis, 20; cirrhosis of spleen, 18; subacute parenchymatous nephritis, 15; acute tubular nephritis, 11; fatty degeneration of liver, 10; venous congestion of liver, 10; chronic pleurisy, 10; hypostatic pneumonia, 10; melanosis of spleen, 4; chronic bronchitis, 3; cirrhosis of liver, 3; metastatic abscess of liver, 2; acute pericarditis, 2; lobar pneumonia, 1; acute peritonitis, 1; acute pleurisy, 1; fibroid pneumonia, 1; pulmonary tuberculosis, 1.
Gangrenous	2	Chronic enteritis, 2; chronic gastritis 2; fatty degeneration of liver, 2; acute peritonitis, 1; acute nephritis 1; subacute nephritis, 1; broncho-pneumonia, 1; arterio sclerosis, 1.
Amœbic	23	Chronic enteritis, 17; chronic gastritis, 10; acute nephritis, 13; abscess of liver, 9; cirrhosis of spleen, 9; venous congestion of liver, 8; fatty degeneration of liver, 7; subacute parenchymatous nephritis, 7; acute peritonitis, 5 (3 due to liver abscess opening into abdomen); chronic nephritis, 2; hypertrophy of heart, 2; pulmonary tuberculosis, 2; abscess of kidney, 2; empyema, 2 (both due to rupture of liver abscess into the pleural cavity); acute pericarditis, 1 (due to perforation of amœbic abscess into the pericardial cavity): acute bronchitis, 1; chronic pleurisy, 1; arterio sclerosis, 1.

Cause of death.	Number of cases.	Complications.
Chronic enteritis	7	Fatty degeneration of liver, 6; acute nephritis, 5; chronic pleurisy, 3; chronic gastritis, 5; cirrhosis of spleen, 3; venous congestion of liver, 3; subacute parenchymatous nephritis, 2; colitis, 2; chronic nephritis, 1; venous congestion of spleen, 1; fatty degeneration of heart, 1; acute bronchitis, 1; bronchopneumonia, 1; arterio sclerosis, 1.
Pulmonary tuberculosis	22	Acute nephritis, 14; tuberculosis of intestine, 12; fatty degeneration of liver, 10; chronic pleurisy, 8; venous congestion of liver, 8; chronic enteritis, 5; empyema, 5; cirrhosis of liver, 4; cirrhosis of spleen, 4; acute pericarditis, 3; chronic gastritis, 3; tuberculosis of kidneys, 2; tuberculosis of spleen, 2; chronic dysentery, 2; chronic pericarditis, 2; acute pleurisy, 2; tuberculosis of liver, 2; amœbic dysentery, 1; chronic nephritis, 1; tubercular meningitis, 1; chronic colitis, 1; ascites, 1; acute appendicitis, 1.
Lobar pneumonia	19	Acute nephritis, 15; acute pleurisy, 15; fatty degeneration of liver, 14; venous congestion of liver, 10; acute pericarditis, 9; hypertrophy of heart, 16; acute splenitis 8; chronic enteritis, 6; acute gastritis, 4; chronic gastritis, 2; subacute parenchymatous nephritis, 2; acute meningitis, 1; chronic pleurisy, 1; arterio sclerosis, 1,
Broncho-pneumonia	6	Acute nephritis, 6; acute pleurisy, 5; hypertrophy of heart, 4; venous congestion of liver, 4; acute pericarditis, 2; chronic enteritis, 1; chronic gastritis, 1.
Pernicious anæmia	3	Subacute parenchymatous nephritis, 3; venous congestion of liver, 3; fatty degeneration of liver, 3; dilatation of right heart, 3; acute pleurisy, 2; œdema of pericardium, 2; hypertrophy of spleen, 1; bronchopneumonia, 1.

From the foregoing table it will be seen how numerous are the complications which attend some of the diseases which produce the greatest fatality in soldiers returning from the Philippine Islands. Because of their importance I wish to consider, somewhat at length, the complications attending dysentery.

Complications observed at autopsy in cases of dysentery.—In the study of post-mortem material presented in autopsies upon patients dying at this hospital from dysentery, I have paid especial attention to the pathological conditions present in the various organs. These have been so constant, and in many instances so important, that it seems to me that they should be considered more at length than they are in most of the text-books upon medicine. In looking up the subject of the complications attending dysentery in recent works, I have been surprised at the scant attention which they have received. For instance, in Davidson's article upon dysentery in Volume II of Allbut's System of Medicine no mention whatever is made of the complications attending the disease. In Lafleur's article upon amœbic dysentery in the same volume, the complications attending it are dismissed in a very few lines, the only ones which received much attention being abscess of the liver and intestinal perforation. This lack of detailed description of the complications in dysentery is the more surprising, as in the cases which have died at this hospital the complications have been very severe, and in many instances have been the cause of death. While it is possible that many of the complications may have been due to campaigning in tropical countries, with the incident hardships and lack of hygienic living, yet many of them are so constant that it is impossible not to believe that they are due to the disease itself.

In considering the subject I shall first consider the complications as a whole, without relation to their occurrence in the various forms of dysentery observed here, and afterwards consider the complications as relative to the different varieties of the disease. In the 73 cases of fatal dysentery which have been autopsied the complications present may be divided as follows:

Complications observed in the nervous system.—The brain in nearly every case in which it was examined (35) showed an increase in the amount of cerebro-spinal fluid. Often this increase was very excessive, the brain being œdematous. Upon dissection of the brain the lateral ventricles were invariably found filled with fluid and the choroid plexus was invariably congested. In all the cases of amœbic dysentery the blood vessels of the cerebrum were very much congested and in about one-half of the cases small capillary hemorrhages had occurred. In all the cases of follicular dysentery the cut surface of the cerebrum was anæmic in appearance, while in the diphtheritic and gangrenous forms the cut surface was as a rule congested. In 3 cases of amœbic dysentery and in 2 of the gangrenous form small areas of softening were presented in the frontal lobes near the median fissure.

Complications observed in the respiratory system.—The most common conditions found complicating dysentery, in the lungs, were emphysema and bronchopneumonia.

Of the 73 cases, 42 showed an emphysematous condition of the lungs, while 21 showed a condition of bronchopneumonia. Perhaps a better name to designate this pneumonia is hypostatic, as it is probably due to maintaining a recumbent position for so long a time, but as the pathological conditions are identical with those found in bronchopneumonia I have preferred to retain that name. Another very common condition found is chronic pleurisy, which was found in 16 cases. This condition was evidently, in all these cases, of long standing. Lobar pneumonia occurred in 4 cases and was the cause of death in all. Chronic bronchitis occurred in 5 cases, acute bronchitis in 1 case, acute pleurisy in 1 case, infarcts of lung in 2 cases, and pulmonary tuberculosis in 3 cases. Empyema was found in 2 cases, both due to a rupture of liver abscess into the pleural cavity. Metastatic abscesses of the lung were found in both cases of gangrenous dysentery, and in both cases was associated with abscess of the spleen and kidney. The two most frequent complications in the respiratory system were emphysema and bronchopneumonia and these are also the two which would be most likely to occur, owing to the weakness and recumbent posture of the patient. In every case a good deal of congestion of the lower lobes of the lungs was observed, but I have only considered the condition as one of bronchopneumonia when the characteristic pathological lesions were present upon microscopical examination.

Complications observed in the circulatory system.—In 51 of the cases the amount of fluid in the pericardial cavity was markedly increased. This œdema of the pericardium is one of the most characteristic complications observed in the fatal cases of dysentery. The fluid was in most instances clear, of a light yellowish color, but in a few cases small shreds of fibrin were present.

Acute pericarditis.—This complication was observed in 5 cases, and in every case the effusion was purulent. In 1 case the pericarditis was due to perforation of an amœbic abscess of the liver into the pericardial cavity.

The heart.—In none of the cases were any of the complications present due to a disease of the heart. Arteriosclerosis was presented in only 2 cases—1 of the gangrenous dysentery and the other amœbic dysentery.

Complications observed in the genito-urinary system—Kidneys.—Some form of inflammation of the kidney was presented in almost every case of dysentery which came to autopsy. Thus, out of 73 cases 63 showed some form of nephritis. Of the varieties of the inflammation of the kidney, acute tubular nephritis was the most common, 32 of the 63 cases being caused by this variety. Next in frequency comes the subacute parenchymatous form, which furnishes 26 of the cases. The remaining 5 were due to chronic interstitial nephritis.

In every case of dysentery which has come to autopsy at this hospital there has been more or less congestion of the kidneys, but microscopical appearances of nephritis were present in 63 of the cases. This very large percentage of kidney disease accompanying chronic dysentery would seem to indicate that the kidneys are especially susceptible to the poisons which are elaborated during the process of the dysenteric infection. There was nothing peculiar noticed about the microscopical appearance of the sections from the kidneys in nephritis complicating dysentery beyond the fact that in the gangrenous cases there were present minute abscesses due to the lodgment of some bacterial emboli in the organs.

In those cases which presented a chronic interstitial form of nephritis there was a history of alcoholism which probably accounted for the character of the complication.

Complications observed in the glandular system—The liver—fatty degeneration.—The most common complication found in the liver was fatty degeneration, which was present in 35 of the cases. Upon microscopical examination the fatty degeneration was found to be very extensive, in most instances large areas being apparently composed of fat, all trace of the liver tissue having been lost.

Venous congestion.—The next most common complication observed in the liver was chronic venous congestion, present in 21 cases. Microscopically this condition was often shown to be very marked, the capillaries being gorged with blood, and in many cases having ruptured into one another and destroyed the liver tissue in the vicinity.

Cirrhosis.—Cirrhosis of the liver was observed in four cases. In all, the condition was one of common interlobular cirrhosis of slight extension. In a large number of cases, however, a condition was presented which was evidently the commencing stage of cirrhosis, in that while the increase in the interlobular connective tissue was somewhat increased in amount, the condition was not well enough established to class it as a distinct cirrhosis. In most cases this increase in the connective tissue was undoubtedly due to a recent profuse hepatitis.

Metastatic abscesses.—In 2 cases of dysentery metastatic abscesses were found. This condition is somewhat rare in the liver, but it is common in the lungs, as a rule, although in the cases observed this year metastatic abscesses occurred with the same frequency in both situations.

Amœbic abscesses.—Amœbic abscesses of the liver occurred in 9 of the fatal cases of dysentery, and in all cases in which it occurred the classical pathological findings of amœbic dysentery were present.

These liver abscesses varied in size from small ones, measuring about 2 centimeters in diameter to those measuring 12 centimeters in diameter, and in number from 1 to 10. They contained, as a rule, greenish pus, with blood and a chocolate-colored substance. Their walls were very ragged in appearance, however, there being very seldom any well-marked fibrous layer bounding the abscess. In 3 cases abscesses of the liver had perforated into the pleural cavity, causing empyema, and in 1 case the abscess perforated into the pericardial cavity, causing acute pericarditis. Thus it will be seen that of the 9 cases of amœbic abscess of the liver 6 had perforated and given rise to complications which caused death.

The spleen—Cirrhosis.—Altogether the most common complication observed in the spleen was cirrhosis of the organ, due to the increased growth of the connective tissue of the capsule, trabeculæ and the Malpighian corpuscles. This condition was present in 29 cases, being the most common in the diphtheritic variety of the disease. In the cases of gangrenous and amœbic dysentery there was generally present an acute inflammation of the spleen, as shown by its congestion, tense capsule, and diffluent consistence.

Infarcts.—Two cases of dysentery showed infarcts of the spleen.

Melanosis.—Melanosis of the spleen, due to previous or concurrent malarial infection, was present in 4 cases.

Complications observed in the digestive system—Chronic enteritis.—As would be expected, chronic enteritis almost invariably accompanied the dysenteric process. Of the 73 cases, 54 showed a marked chronic enteritis, while 10 of the 19 remaining showed some inflammation of the small intestines, but not marked enough to class as a distinct enteritis. In all the cases which I have considered as enteritis the inflammatory condition present extended as far as the stomach.

Chronic gastritis.—Next in frequency to chronic enteritis, as a complication, comes chronic gastritis, which was present in 38 of the cases. In nearly every case the gastritis was of considerable severity.

Perforation of the intestine.—In 4 cases perforation due to dysenteric ulcerations of the intestine was present. In all these cases the perforation occurred in the rectum.

Acute peritonitis.—In 7 cases acute peritonitis was found at autopsy, due in 3 cases to perforation of a liver abscess into the abdominal cavity, and in the remaining cases to perforation of the intestine by dysenteric ulcers.

Complications in relation to the type of dysentery.—As regards the frequency of the occurrence of the various complications in the various types of dysentery, I shall consider only those which are of the most importance. Abscess of the liver occurred only in the amœbic and diphtheritic forms. Of 23 cases of amœbic dysentery, 9 showed liver abscesses. Of the 30 cases of diphtheritic dysentery, 2 showed the presence of metastatic abscess in the liver.

Nephritis.—Acute nephritis was present most often in the amœbic form of the dysentery, 13 out of 23 cases showing it. Next in frequency comes the diphteritic variety, which presents 11 cases out of 30. The follicular form of dysentery showed the fewest cases of nephritis, only 7 out of 18 being observed. If we consider the cases of gangrenous dysentery, it is seen that 1 case of 2 presented an acute form of nephritis, giving a percentage of 50, but the number of cases observed is not sufficient for us to base any conclusions upon.

Subacute parenchymatous nephritis was the most common in the diphtheritic form of the dysentery, 15 out of 30 cases presenting it. Next in frequency comes the amœbic form, in which 7 out of 23 cases showed it, while the follicular form showed 3 out of 18 cases. The gangrenous form showed 1 out of 2 cases. Chronic nephritis was the most common in the follicular form of dysentery, 3 out of 18 cases showing it.

Fatty degeneration of the liver.—This complication was the most common in the follicular and diphtheritic forms of dysentery, the follicular form showing 6 out of 18 cases, and the diptheritic form 10 out of 30 cases. The amœbic form showed 7 out of 23 cases.

Venous congestion of the liver.—This complication was most common in the diphtheritic form of dysentery, 10 cases out of 30 presenting it. The amœbic form presented the condition in 8 cases out of 23, and the follicular form in 3 cases out of 18.

Cirrhosis of the spleen.—This complication was most frequent in the diphtheritic form of dysentery, 18 out of 30 cases showing it. The next in frequency is the amœbic dysentery, with 9 cases out of 23, while only 2 instances of it occurred in the 18 follicular cases.

Acute peritonitis.—Acute peritonitis was most common in the amœbic form of dysentery, 5 out of 23 cases presenting this complication. In 3 cases it was due to rupture of liver abscess, and in 2 to the perforation of the intestines. The gangrenous form of dysentery showed 1 case of acute peritonitis, due to perforation of the intestines, which was also true of the diphtheritic form.

From the above summary of the complications of the various forms of dysentery it will be observed that the most serious complications are most frequent in the severer forms of the dysenteric process; as, for instance, in the diphtheritic, gangrenous, and amœbic types, while they are the least common in the follicular form, which is also the least severe from a pathological standpoint.

From the study of the complications which attend dysentery it will be seen how numerous and important they are. It is not too much to say that in a large proportion of the cases which resulted fatally death was due more to the complications than to the dysenteric affection.

The various forms of dysentery.—During the past year, from the study of the cases on the post-mortem table, I have seen no reason for changing my conceptions of the various forms of dysentery, considered from the standpoint of a pathologist. Considered in this way I make the following distinctions as to classification: Chronic dysentery nonamœbic and chronic dysentery amœbic. In the nonamœbic there may be recognized three stages of the disease, i. e., follicular, pseudodiphtheritic, and gangrenous. These three stages, however, belong to one process, the disease beginning as the follicular affection and gradually assuming the process found in the pseudodiphtheritic and gangrenous form. In other words, the three divisions named are simply stages of one process, the gangrenous being the result of the follicular and pseudodiphtheritic. I believe that a certain portion of this nonamœbic dysentery is the chronic form of specific dysentery observed in the Philippines. This I believe because I have been able, in a few instances, to separate the bacillus of Shiga from the intestine in cases of the follicular and pseudodiphtheritic forms of dysentery which have died at this hospital.

Under the amœbic form I include all cases of dysentery in which the amœbæ are present in the fæces and which present at autopsy the characteristic pathological picture which is found in dysentery due to the amœbæ.

The pathological appearance present in the intestine in amœbic dysentery differs very remarkably from that present in the other forms, and one has no difficulty whatever in diagnosing the amœbic from the other varieties of dysentery from the character of the ulcers alone. I shall not consider here the pathology of dysentery, as I have already covered the subject in a previous report and see no reason for changing any of my views regarding it.

Many of the cases which died of dysentery at this hospital gave a history of previous malarial infection, but only a small number showed any trace of such infection at autopsy. There have been a large number of cases of malaria treated at this hospital, but only one case that resulted fatally. The patient suffered from the quotidian estivo-autumnal infection and despite all treatment gradually passed into a comatose condition, which resulted in death. The autopsy findings in this case were so typical of the condition present in pernicious estivo-autumnal fever that I shall insert here the anatomical and microscopical reports.

A CASE OF PERNICIOUS QUOTIDIAN ESTIVO-AUTUMNAL FEVER, ILLUSTRATING ANATOMICAL AND MICROSCOPICAL CHANGES IN FATAL CASES.

R. G. C., teamster. Died, 4.30 a. m. July 21, 1900. Age, 52 years. Clinical diagnosis: Pernicious quotidian estivo-autumnal fever.

Body that of a man apparently 52 years of age, somewhat emaciated. Skin yellowish. Rigor mortis slight. Post-mortem discoloration over dependent portions of the body. Finger nails not congested. Pupils irregularly dilated.

Brain.—Dura mater appears normal. The amount of cerebro-spinal fluid is increased. The surface of the cerebrum is pale, and upon section the medullary portion appears hyperæmic, and the cortex is slate colored. The lateral ventricles are filled with fluid. The choroid plexus is not congested. Upon section the cut surface of the cerebellum appears normal, save for congestion and slight pigmentation. Externally the blood vessels of the cerebrum are congested.

Thoracic and abdominal cavities.—The subcutaneous fat and muscular tissues are normal in amount. The pleural cavities are free from fluid. The liver reaches about 1 centimeter below the border of the last rib. The greater omentum contains a large amount of fat and reaches to a level with the umbilicus. The appendix is about 3 centimeters in length and lies in the right iliac fossa. It is normal in appearance. The bladder is dilated. The abdominal aorta shows no evidence of sclerosis. The suprarenal glands appear normal.

Liver.—The liver measures 28 by 21 centimeters. It is dark in color externally.

The gall bladder contains a large number of gall stones, and some inspissated bile. Upon section the cut surface of the organ is slate colored, and the lobules are ill defined. The organ is congested. Weight, 1,640 grams.

Spleen.—The spleen measures 19 by 12 centimeters. The organ is purplish black in color externally. The capsule is smooth. Upon section the cut surface appears almost black in color, with light areas scattered throughout it. The consistence of the organ is very much diminished, it being almost diffluent. Weight, 440 grams.

Pancreas.—The pancreas measures 22 by 4½ centimeters. Upon section the cut surface appears congested. Weight, 115 grams.

Left kidney.—The organ is pale in color. The capsule is smooth and slightly adherent. Upon section the cut surface is congested. The cortex and pyramids are distinct, and the cortex is normal in thickness. Weight, 125 grams.

Right kidney.—The organ is somewhat lobulated. The capsule is slightly adherent; otherwise it resembles the left. Weight, 125 grams.

Lungs.—The lungs are crepitant throughout and appear normal. The pericardial cavity contains about 30 cubic centimeters of clear straw-colored fluid.

Heart.—The amount of extracardial fat is increased. The vessels are congested. Upon section the ventricles contain small clots. The muscular walls are about normal in thickness. The valves of the heart are normal, with the exception of the middle segment of the pulmonary valve, which contains numerous small apertures.

Intestines.—The mucous membrane is congested; otherwise they are normal.

MICROSCOPICAL EXAMINATION.

Liver.—Sections of the liver show the pathological lesions of cloudy swelling and the changes found in pernicious malarial fever. The fibrous tissue in the portal spaces has slightly increased in amount, and there are large numbers of connective tissue cells present. All the blood vessels in the organ are increased in thickness. The liver cells are swollen, smoky, and granular in appearance, and in many of them the nucleus is present and shows necrotic changes, as evidenced by the pale stain and the granules of the chromatin, which are widely separated or are collected in small clumps. The protoplasm of the liver cells contains much fine yellowish pigment, which seems to be distributed only in the protoplasm, and not in the nucleus. The intralobular capillaries contain a great deal of black pigment, numerous large macrophages, and smaller mononuclear leucocytes. The pigment, which is free in the capillaries, is in the form of irregular blocks, and none of the yellow pigment which is present in the liver cells is seen in the capillaries. The large macrophages which crowd the capillaries contain within their protoplasm an immense amount of black pigment, evidently derived from broken-down malarial parasites They also contain blood corpuscles containing parasites and free parasites of the estivo-autumnal variety. The number of parasites present is comparatively small, but the amount of pigment present is immense, and in clumps so large that many of the capillaries are occluded by it. This is especially noticeable in the capillaries near the portal spaces. On account of the small caliber of the interlobular capillaries the large macrophages are compressed and they appear often as large, slender, pigment-bearing cells. Some of these leucocytes are so large as to entirely block the capillaries. The malarial parasites present are small, round, or oval bodies, generally collected at the center. These are presegmenting parasites. No crescent forms were observed in the liver. The stellate cells of Kupfer contain black pigment and sometimes small parasites. In numerous places throughout the capillaries of the liver there are large bleb-like parasites containing pigment, which are evidently degenerating. The pigment in the macrophages is in the form of small, round blocks or larger irregular collections, and is dark brown or almost black in color. There is not a single capillary in the sections that does not show pigment-bearing cells.

Spleen.—Sections of the spleen show the changes characteristic of pernicious malarial fever. The Malpighian bodies are somewhat fibrous, and at their border there is an immense amount of yellowish-black pigment. The splenic pulp contains a small number of red corpuscles, which contain small round or oval estivo-autumnal parasites, which are pigmented. There is not the usual number of red corpuscles present in this spleen that we generally find in the spleens from cases of pernicious malaria. The splenic pulp also contains immense numbers of macrophages and large masses of free pigment. The macrophages are large white cells, which contain the following objects: (1) Large irregular collections of brownish-black pigment; (2) red corpuscles containing small round, pigmented estivo-autumnal parasites; (3) free estivo-autumnal parasites, most of them pigmented or showing signs of segmenting; (4) fine granules of yellowish pigment, which is entirely distinct from the black pigment present.

Some of the macrophages show all of these within their protoplasm, while others, and they are in the majority, show only one or two free parasites and irregular collections of pigment. As a rule these white cells are about six times the size of a blood corpuscle, but some of them are present which are very much larger. These very large cells entirely block the capillaries of the organ, thus hindering the circulation.

Besides the macrophages there are numerous mononuclear leucocytes and endothelial cells which do not take up the pigment of the parasites. The polymorphonuclear leucocytes are comparatively few in number. Everywhere throughout the sections there are very large masses of pigment situated in the spaces of the splenic pulp, often so large as to rupture them and cause an area of necrosis in which they are situated.

Throughout the spleen may be seen the crescentic forms of the quotidian estivo-autumnal parasite, but they are comparatively few in number. These crescents appear exactly as they do in the peripheral blood. In the spleen there are also numerous large bleb-like parasites like those seen in the liver, which contain much pigment and numerous vacuoles. These are evidently degenerating bodies. The segmenting forms of the parasite are remarkably few in number in the sections of the spleen, but many of the macrophages contain segmenting bodies.

Kidney.—Sections of the kidney show the pathological lesions of acute nephritis and the changes present in pernicious malaria. The Malpighian bodies are greatly congested, the capillaries being filled with blood and some of them have ruptured, thus causing hemorrhages within the tufts. Many of the capillaries contain small, free, round, or oval parasites, containing a small clump of pigment at their center. The capillaries also contain a few red cells which are infected by the parasites. There is present a small amount of free pigment. In the capillaries may be seen, now and then, a large bleb-like body, evidently a degenerated parasite, like those seen in the liver and spleen. The number of infected corpuscles and free parasites and the amount of pigment is very much smaller than in the case of the liver and spleen. No crescent forms were observed in the Malpighian bodies. The epithelium of the tubules is much swollen and is rapidly proliferating, while the protoplasm of the cells is smoky and finely granular in appearance, and contains, in many instances, pigment grains of a yellowish color.

One of the most interesting features of the kidney sections is the occurrence within many of the tubules of collections of black pigment and here and there a few parasites. There are few parasite-infected red blood corpuscles present in the tubules. The capillaries between the tubules contain numerous free parasites, round or oval in shape, and pigmented; also macrophages and infected red corpuscles. The macrophages, as in the liver and spleen, contain free pigment and parasites, and red corpuscles containing parasites or yellowish pigment. The walls of the capillaries are not thickened. It is especially noticeable how slight the amount of pigment is in the kidneys, as compared with the liver and spleen, and how few parasites are present.

Brain.—Sections of the brain show the pathological lesions of pernicious estivo-autumnal fever of comatose type. The changes observed in the sections of the brain may be divided into those occurring in the capillaries and those within the brain substance proper. The small capillaries of the brain, especially those of the cortex, are crowded with pigmented free parasites, leucocytes containing pigment, and in some places by small collections of yellow pigment. The infected capillaries are most numerous in the cortical portion of the brain, but they are by no means rare in the medullary portion. The pigment in the capillaries is generally collected in irregular masses, is brownish in color, and in some places entirely occludes the lumen of the capillary. This condition, which is very noticeable throughout the sections, no doubt accounts for the symptoms present referable to the brain. The parasites present in the capillaries are mostly free; are oval or circular in shape, small, and contain pigment which is generally collected near the center in the form of small grains or collections of grains. It is remarkable how uniform these parasites are in appearance, and how rarely is seen a red cell infected by parasites. It may be that during the preparation of the specimen the red cells become disintegrated, but this is hardly probable. In some places the capillaries are occluded by large white cells (macrophages), containing much pigment and numerous free parasites. Taken as a whole the pigment present in the brain is not large.

The changes occurring within the substance of the brain consist in a necrosis of the protoplasm of some of the cells, as is evidenced by the irregular staining of the protoplasm and nuclei.

Intestines.—Sections were not made of the stomach and intestines, as they presented no evidence of malarial infection.

During the year there have been three fatal cases at this hospital in which, before death, numerous amœbæ, indistinguishable from those found in dysentery, were present in the fæces, but in which at autopsy none of the pathological appearances typical of dysentery were present. Fæces in these cases did not differ markedly from those common to amœbic dysentery, save that no blood was present in them. The amœbæ present occurred in great numbers and were perfectly typical of the amœbæ of dysentery. These cases conclusively prove that the amœbæ can be present in the intestine without producing any disease, as in all these cases the large intestine appeared normal, the only condition present being chronic enteritis and gastritis. While it can not be denied that in cases of amœbic dysentery the amœbæ produce typical lesions in the large intestine, it is a question in my mind whether they are the primary cause of the disease. From the conditions found in the cases just mentioned I would be inclined to regard the amœbæ as a secondary feature in the production of dysentery. Of course it may be possible that the individuals in which these amœbæ were found were peculiarly resistent to their action, or that some peculiar condition was present in the large intestine which prevented the amœbæ from obtaining a foothold. But even if we allow this argument it is one in favor of the amœbæ being a secondary feature, as, unless such conditions were present, it would remain harmless. I am satisfied, from my examinations of fæces and the clinical symptoms, that the amœbæ are often present in the intestine without producing dysentery.

Regarding the preparation of microscopical sections from the cases which were autopsied, I would say that I have found it to be a most valuable routine procedure, as by so doing many changes were found to be present in the viscera which were not visible to the naked eye, and thus a more accurate and scientific diagnosis of the fatal cases arrived at. I have felt that, although it entails in the laboratory an immense amount of work, the results gained have more than paid for the trouble taken.

(F) MISCELLANEOUS EXAMINATIONS.

There have been 345 examinations which I have classed as miscellaneous. These have included special researches, examinations of cultures and smears from cases of suspected diphtheria, water and milk analyses, and examinations of urine and sputa for the officer in charge of the mustering out of United States Volunteers.

During the year, by direction of the commanding officer, I have sectioned the appendix in every case which has been operated upon by him, and a record has been kept of the pathological findings. Photomicrographs have been taken of a large number of sections, but, on account of inadequate apparatus for fine work in this direction, they have not been as satisfactory as could be desired. Cases of appendicitis operated upon, and of which sections were made, may be divided as follows, from a clinical standpoint: Acute appendicitis; recurrent appendicitis.

Every case operated upon at this hospital has shown some pathological change in the appendix, and from the standpoint of a pathologist they may be divided as follows: Catarrhal, obliterative, ulcerative, perforative, cystic.

The general pathology of appendicitis as shown by cases operated upon.—In describing the general pathology of appendicitis a brief review of the normal structure of the appendix is necessary. In its histological structure it resembles the large intestine, being composed of four coats, i. e., serous, muscular, submucous, and mucous.

The serous coat, or, more accurately speaking, the peritoneal, is the outermost coat, and is composed of a very thin layer of fibrous tissue, covered upon its outer surface by a layer of endothelial cells.

The muscular coat is composed of an external layer of longitudinal fibers and an internal layer of circular fibers. Normally the longitudinal layer of fibers is much thinner than the inner or circular layer, which is thick and strong.

The submucous coat normally is rather thin and composed of a very loose connective tissue which supports the blood vessels, lymphatics, and nerves. It also connects the circular muscular coat to the mucous coat.

The mucous coat, or mucosa, is the most interesting form from a pathological standpoint, as it is here that the first changes take place in disease of the appendix. It is devoid of villi and Peyer's patches, as is the large intestine generally, and consists of a base of adenoid tissue supporting a large number of simple tubular glands of Lieberkuhn. These glands rest upon a very narrow mucosa. The mucous layer also contains a large number of the so-called solitary glands or follicles.

Embedded in the adenoid tissue lie the tubular glands, each consisting of a delicate membrane, lined by a row of columnar epithelium, which is continuous with the lining of the mucous coat. The tubular glands in the appendix are much longer than the similar glands in the small intestine. The closed ends of these glands reach nearly to the muscularis mucosæ. The solitary glands or follicles are masses of adenoid tissue, generally oval in shape and filled with leucocytes. Their lower border projects into the submucous layer while their apices lie in the mucous layer, being covered by the tubular glands and the epithelium lining the appendix. These glands are surrounded by lymphatics, and are quite numerous.

Lining the entire interior of the appendix is a delicate layer of epithelium continuous with that lining the glands of Lieberkuhn.

Having thus briefly considered the normal histology of the appendix, a better understanding is possible of the pathological changes which may occur in the various forms of appendicitis.

The pathological changes met with vary from those of a simple inflammation, with a limited invasion of the tissues by leucocytes, to pus formation, ulceration, and necrosis of the entire wall of the appendix in places, and consequently perforation. The specimens examined embrace all the stages mentioned, from the slightly inflamed appendix containing no pus to the necrosed and perforated appendix filled with purulent exudation. Of those examined eleven were diagnosed clinically as cases of recurrent appendicitis. Of these the appendix was examined microscopically in fifteen, sections being cut out and stained and photomicrographs prepared.

Taken as a whole the specimens sectioned may be divided as regards the pathological changes present into the following classes, i. e., catarrhal, obliterative, ulcerative, perforative, and cystic.

The catarrhal type.—This, the mildest type of appendicitis as regards the pathological changes present, is characterized by congestion of the mucous coat, infiltration of the mucous coat and submucous coat by leucocytes, and the production of more or less mucus within the appendicular canal. There were only two instances of this rapidity of the disease examined—the cases of C. A., private, Hospital Corps, United States Army, and Private J. C., Company H, Sixteenth United States Infantry.

In the latter case the lesions found were very typical, and essentially as follows: The adenoid tissue between the tubular glands was thickly infiltrated by leucocytes, in some places so much so as to compress the glands. Many of the glands were actively secreting mucous which bathed the surface of the glandular layer, having dstroyed the delicate epithelium covering it. The appendicular canal contained much thick mucous. Large hemorrhagic areas have been formed in both the submucous and external muscular coats, due to rupture of the small capillaries in those regions brought about by their distension with blood. The submucous coat, besides containing these hemorrhagic areas, show some infiltration by leucocytes. A peculiar feature noticed was that some of the solitary follicles seem to have been replaced by hemorrhagic areas. The circular and longitudinal layers preserve their relative thickness and were not infiltrated by leucocytes. In this type of appendicitis the chief changes are found in the glandular layers of the mucous coat, consisting in an infiltration of the adenoid tissue by leucocytes, which has produced a large amount of mucus, together with the congestion of blood vessels of the entire appendix. The naked-eye appearance of the appendix in the cases of catarrhal inflammation is not very diagnostic. The appendix may seem to be a little or not at all inflamed externally, although there may be extensive catarrhal condition present.

In the case of A., the catarrhal inflammation had caused so much inflammation of the glandular layer by leucocytes as to obliterate a destruction of the glands. This condition is only present in cases which have suffered for some time with an attack, or from repeated attacks. It is not an ulceration, but the inflammation of leucocytes seem simply to occlude and cut off the glands. The condition of catarrhal inflammation will undoubtedly lead to repeated attacks, any of which may result in ulceration and perforation, if allowed to run their course.

The obliterative type.—This type of appendicitis was present in two of the cases examined, i. e., Lieutenant J. R., Sixth United States Cavalry, and Private E., Twenty-First United States Infantry. The pathological changes found in the obliterative appendicitis occurred only in those cases which had had more than one attack—that is, in recurrent appendicitis. Obliterative changes, however, do not occur in the majority of cases where, for some unknown reason, a reproductive instead of a destructive process results. The changes present consist essentially in the production of newly formed tissue in regions where it is normally present, as in the mucous layer. It is really a cirrhosis of the appendix, the mucous layer being crowded out, so to speak, by the newly formed connective tissue, which eventually entirely occludes the appendicular canal. The changes in the mucous coat consist in a great thickening and infiltration of it by numerous leucocytes, young connective tissue cells, and fibriles of connective tissue.

In the appendix of Lieutenant R. this condition is well illustrated. The canal of the appendix was entirely filled with new tissue, composed of fibers and multitudes of leucocytes and connective tissue cells. In some places this newly formed tissue had become vascular, small blood vessels having formed which supplied it with nourishment. The glandular layer had entirely disappeared, no trace of the glandular structure being visible in any portion.

In the case of Private E. the entire canal was occluded with newly formed connective tissue, and in places large hemorrhagic areas had formed, evidently due to the rupture of the capillaries in the vicinity. The structure of the mucous coat in this case was entirely lost, save for a few isolated glands surrounded by much fibrous tissue. The submucous coat in cases of obliterative appendicitis is generally thickly infiltrated by leucocytes, much thickened and very fibrous. The muscular coats are somewhat thickened, especially the circular muscular coat, and are infiltrated by comparatively few leucocytes.

The result in cases of obliterative appendicitis, as shown by the pathological changes, would in most instances be necrosis and perforation. The newly formed connective tissue, unless amply supplied with blood, will degenerate and ultimately necrosis will take place. In a few instances obliterative changes may occur and the newly formed tissue be so well supplied with blood vessels that the result would be simply the shutting off of the appendix, which, provided that it take place at the extremity of the appendix, will not result in harm to the patient. If, however, the obliteration takes place at any other portion of the appendix, the closing up of the portion between it and the extremity will almost certainly result in ulceration and perforation after repeated attacks. The changes present in obliterative appendicitis is most noticeable in the mucous and submucous coats, and consists essentially in the rapid production of newly formed connective tissue which replaces the normal structure of the appendix.

The ulcerative type.—The ulcerative type of appendicitis was found in all the cases examined. This condition is simply a step in the process toward perforation, and while pathologically it presents certain definite features, which, it should be remembered, occur in either acute or chronic cases, and only shows that the process present is only destructive in character, the ulceration varies in extent. There may be but a slight ulceration of the mucous coat, or ulceration extending through the mucous and submucous coats, or ulceration extending through the peritoneal coat. In each the appearances presented are somewhat different in the structures which are affected. In cases where the ulceration extends only to the submucous coat the mucous layer may be intact, save in the ulcerative areas. In such areas the mucous membrane is destroyed down to the submucous coat, the walls of the ulceration being thickly infiltrated by leucocytes, as is also the mucous membrane where no ulceration has occurred. The submucous coat is generally very thickly infiltrated by leucocytes and the solitary follicles are swollen and densely packed with lymphoid cells. As a rule the internal muscular coat is thickly infiltrated by leucocytes, while the external one is generally not affected. This is the most simple and mildest type of appendicitis.

In cases where the ulceration is extended to the muscular coat, the mucous layer of the appendix is very likely to become much degenerated, owing to the extensive infiltration by leucocytes and the consequent pressure upon the tubule. The large areas of mucous membrane may show no glandular structure whatever, this result being due to necrosis. Where the ulceration has taken place the coats of the appendix are especially affected, being greatly infiltrated by leucocytes, the submucous and mucous coats often being indistinguishable from each other, the tubular glands having entirely disappeared and the hemorrhagic areas being present in both the submucous and mucous coats. The internal muscular coat is generally thickly infiltrated by leucocytes, very greatly thickened, sometimes being almost as thick as the normal thickness of the appendix. The mucous layer may be very greatly thickened, so much so as to almost close the appendicular canal. Where the ulceration is extended to the peritoneal coat, the appearances presented are essentially the same, save that the muscular coats are apt to be somewhat thin on account of the pressure of the exudation which is present in the canal. The result in such cases would eventually be perforation, as the amount of tissue involved and the severe character of the ulceration would lead invariably to the destruction of the entire wall of the appendix.

The perforative type.—The perforative type of appendicitis is, from a pathological standpoint, simply the culminating stage which is first evidenced by catarrhal inflammation. The simple catarrhal inflammation ends eventually in ulceration and the ulceration in perforation of the appendix. It is then simply the last step in the inflammatory process. The conditions present are similar to those found in ulcerative appendicitis, save that the ulceration has extended through the peritoneal coat. Very various are the pathological changes found in the appendix which has undergone perforation. The portion farthest away from the perforation, when sectioned, generally shows the catarrhal inflammation, and the nearer the perforation is approached the greater the ulceration present and the more extensive the destruction of the various layers of the appendix. To describe them, the pathology of the appendix in cases where perforation has occurred would be but a repetition of the conditions already described, the only difference being that in the cases which are perforated the lesions are much more severe than in others. The mucous membrane may be entirely destroyed or it may be ulcerated in places. The submucous coat may be so thickly infiltrated by leucocytes as to be indistinguishable. The muscular coat may be thickened or thinner than the normal, or always greatly infiltrated by leucocytes, and in most instances this infiltration has caused a separation of the bundles of muscular fibers. To describe all the pathological changes found in the sections from the appendix would require a volume of needless repetition. The process is simply one of inflammation, acute or chronic, leading ultimately to destruction of the various coats of the appendix, the appearances presented varying with the tissues attacked and the rapidity or slowness of the inflammatory action.

The cystic type.—In one case a true cyst occupied the extremity of the appendix. This case gave a history of recurrent attacks. Microscopically, the extremity of the appendix was very greatly enlarged and filled with true cystic fluid, the cyst when opened measuring one-half centimeter in diameter. The condition found microscopically is described under the case of L. G., quartermaster employee, and will not be repeated here. This case is interesting as it shows the formation of a true cyst, with typical structure, after repeated attacks of inflammation. The cystic wall was typical in every respect. This cystic condition is of very rare occurrence.

In summing up the pathology of appendicitis as shown by these specimens, it will be seen how the process is generally a progressive one, and how dangerous the consequences are apt to be if the simplest catarrhal inflammation is allowed to continue for any length of time. As to the etiological factor concerning the production of the disease, it would appear that any irritant substance capable of exciting inflammation will be all that is needed for the production of an attack of appendicitis. It is undoubtedly due to the invasion of the tissue of the appendix by bacteria, notably the bacillus coli communis, which invasion is made possible by the destruction, in some way, of the guarding layer of epithelium. I can see, however, how a purely mechanical cause, such as a foreign body might, by continued irritation, cause an exudation, which, being confined in the small canal of the appendix, might, by compression, cause necrosis and perforation, without the aid of bacteria, but I believe that in the vast majority of cases the bacillus coli communis is the chief factor in the etiology of the disease.

Briefly stated, then, the pathology of appendicitis may be summed up as follows:

1. An injury to the delicate epithelium lining the interior of the appendix, and constituting its protective barrier.
2. The invasion of the mucous membrane and submucous tissue, rich in lymphatics and blood vessels, by bacteria, chiefly the bacillus coli communis.
3. The infiltration of these layers by leucocytes, which have rallied to repel the invasion, and consequently swelling of the mucous and submucous layers with some exudation.
4. The invasion of the muscular coat by bacteria and leucocytes, with the destruction of the mucous and submucous layers, and the formation of areas of necrosis and ulceration, due to pressure, impaired blood supply, and microbial poisons.
5. The entire destruction, in parts, of the mucous, submucous, muscular, and serous coats, and consequently perforation of the appendix.

As to the causal factor, that which produces the lesion in the epithelium, I believe that there is more than one. Any mechanical, chemical, or bacterial agency capable of injuring this delicate tissue, may be concerned. I do not believe that the primal cause is often bacterial, but after an injury has occurred I believe that the pathological changes which then begin are due to the invasion of the rich lymphatic tissue by bacteria, the chief of which is the bacillus coli communis.

Nuclein and malaria.—By direction of the commanding officer, I have conducted an investigation upon the influence of a preparation known as "nuclein," upon the parasites of malarial fever, as shown by the examination of the blood in certain cases in which it was administered. I have the records of 35 cases reported to me by the attending surgeon, in which the blood examinations were made every other day, and the effect of the medicine carefully noted. Of these 35 cases, 10 were infections with the tertian parasite, 2 with the quartan parasite, and 23 with the estivo-autumnal parasite. Of the whole number, 15 were treated with nuclein alone, and these will be reported upon first. Of these, 8 were infections with the tertian parasite, 2 with the quartan parasite, and 5 with the estivo-autumnal parasite.

Infections with the tertian parasite.—In the eight infections with the tertian parasite the remedy was entirely valueless in so far as preventing the paroxysm was concerned. The parasites remained as numerous in the blood as before the administartion of the remedy, and the paroxysms occurred as usual.

Infections with the quartan parasite.—In the two cases infected with the quartan parasite nuclein was valueless. Paroxysms arrived promptly and were very severe. In one case the proof is very positive that the remedy is powerless in the intermittent malarias. This case showed the quartan parasites in the blood before any definite clinical symptoms were manifest. Nuclein was at once administered and the blood examined every day. Day by day the parasites became more numerous, until at last, several days after beginning treatment, the patient had a severe paroxysm. From this case it will be seen that not only is the remedy unable to prevent the paroxysms after they have once become established, but it is powerless to prevent a paroxysm when only a few parasites are found in the blood and no clinical symptom has as yet appeared.

Infections with the estivo-autumnal parasite.—In these cases the evidence as to the effect of nuclein is contradictory. In two of the cases—one showing numerous ring forms of the tertian estivo-autumnal parasites and numerous crescents, and the other ring forms and pigmented intracellular bodies—nuclein caused the disappearance of the parasites after three days' treatment. I can not say that the disappearance was due to other factors than the nuclein. In the three other cases nuclein had no effect whatever upon the parasites.

From these cases it would be seen that the remedy is probably of no specific therapeutic value in the malarial fevers.

Of the twenty cases in which nuclein was administered along with quinine, the effect of the drug is still in doubt. From the examinations of the blood, it was seen that a marked leucocytosis was produced during the first week of its administration, after which the leucocytes remained stationary. The clinical evidence is still more conflicting, as some of the surgeons that have used it claim that it had no beneficial effect, while others thought that it rendered recovery from malaria more complete and rapid.

There is no doubt that the nuclein does cause an increase in the number of the leucocytes, and that, when it is given, phagocytosis is more active, but this alone does not seem to be sufficient to cure the malarial fever. It is not reasonable to suppose that any remedy will so increase the phagocytes as to result in a recovery due to phagocytosis alone. Even in the most pernicious cases of estivo-autumnal malaria, phagocytosis is very active, more so than in the mild cases, which conclusively proves that it has little to do with the recovery from the disease.

From my observation I would conclude that nuclein is a valuable adjunct, along with quinine, in the treatment of the malarial fevers, but that of itself it is not able to effect a cure.

Observations upon the bacillus of Shiga in relation to dysentery.—I have continued my observations upon a bacillus separated from the intestine at autopsy of these cases of dysentery and it has proven to be the same as that discovered by Shiga in Japan and studied very carefully by Flexner and Strong in Manila. This bacillus has proven to be the cause of the acute specific dysentery prevalent in Japan and the Philippines. Cultural peculiarities and the morphology of the organism has been so fully described by the observers quoted that I shall not enter into a description here. I have devoted the most of my attention to the agglutination test and to the effect of the bacillus upon animals. As regards the latter I may say that the results have been so contradictory that I have been unable to draw any positive conclusion from them.

It has been found that this bacillus, which much resembles that of typhoid, will agglutinate when placed in the blood serum of a patient suffering from certain forms of dysentery, designated as an acute specific dysentery.

Using the same method as is used for the Widal test and substituting this bacillus, I have tested the blood serum of 70 cases of dysentery. In making the test I have used a dilution of 1 to 10 and have allowed a time limit of fifteen minutes. The cases tested were all diagnosed as chronic dysentery, and of the 70 cases 20 of them showed the amœbæ in the fæces and were therefore amœbic dysentery. The results of the tests were as follows:

1. Of the 20 amœbic cases only 1 gave a reaction, which was very slight. This case came to autopsy and was found to be a typical case of amœbic dysentery. It was impossible to ascertain whether or not the patient had previously had an attack of the specific variety.

2. Of the 50 remaining cases 21 gave a positive reaction and 29 negative. Of the positive cases 5 came to autopsy, and the pathological conditions present were those of severe diphtheritic dysentery, the ulcerations being very superficial in character and the entire large intestine covered with a thin necrotic membrane covering in the ulcerations. I am satisfied that these cases were the chronic form of the acute specific dysentery observed in the Philippines.

Of the 29 negative cases only 2 came to autopsy, and they were both of the gangrenous type of dysentery.

As a result of these examinations I am inclined to believe that the agglutinated test of Shiga's bacillus is comparable in accuracy with the Widal test. Perhaps this conclusion is a little premature, but the fact that the bacillus does not react in the cases of amœbic dysentery is very significant. I believe, however, that investigations of this test in the acute cases would be more satisfactory.

Large numbers of cultures and smears have been made from cases of suspected diphtheria, but only 1 case proved positive.

Analyses have been made of milk supplied to this hospital, which was found as a rule to be in a satisfactory condition.

(G) AUTOPSIES.

The number of autopsies and the cause of death in the cases autopsied has already been referred to in a section of this report treating of the examinations of post-mortem material.

In conclusion, I have the honor to state that the laboratory is excellently equipped and the apparatus is in good condition.

X-RAY LABORATORY.

During the year a large amount of work has been done in the X-ray laboratory consisting of fluoroscopic examinations and the taking of radiographs. The work has been done with a static machine which has proved very satisfactory, the one objection to it being the tendency of slight moisture to discharge the machine. This, however, has not affected its utility during the last six months. Besides the use of the static machine for radiographic purposes, it has also been used in the treatment, by electricity, of certain nervous diseases and myalgia.

The exact number of fluoroscopic examinations made has not been recorded, but will range somewhere between 125 and 150. These examinations have proven of great value in locating bullets, which were afterwards removed by operation; in detecting the amount of injury to the bone from gunshot wounds, and in the treatment of fractures.

During the six months ending June 30, 1901, there were 25 fluoroscopic examinations made to ascertain if the bone had been injured or a bullet remained in the tissues in certain cases, all of which resulted negatively. These examinations are of interest as showing how easy it is in such cases to ascertain by the X-ray the condition present and how difficult it is clinically, in many instances, to make a diagnosis. These negative examinations were divided as follows:

Suspected fractures	10
Suspected luxations	2
Suspected aneurism of the arch of the aorta	1
Gunshot wound (to ascertain if bullet remained)	12

The total number of radiographs made since January 1, 1901, has been 92. These are divided as follows:

Gunshot wound of—	
Chest	6
Shoulder	4
Arm	4
Elbow	3
Forearm	4
Hand	6
Pelvis	3
Hip	7
Thigh	7
Knee	3
Leg	5
Foot	4
Fracture of—	
Phalanges of hand	5
Humerus	2
Femur	1
Patella	1
Tibia and fibula	6
Clavicle	1
Inferior maxilla	1
Miscellaneous	19
Total	92

A copy of these radiographs will be submitted very shortly.

The total number of patients examined in the X-ray clinic since January 1, 1901, has been 117, divided as follows:

Regulars	47
Volunteers	65
Civilians	5
Total	117

The X-ray laboratory and electrical department are equipped with a Morton-Wimshurst-Holtz ten-plate static machine with full set of electrodes, one-fifth horse-power motor, Cleaves current controller, Cyrus Edson's ozone inhaler, Monell's interrupters, Crookes' tubes, fluoroscopes with barium-platino-cyanide screens, and complete equipment for radiograph work. This work has been much improved by better facilities in the photographic department. A commodious dark room was built, fitted with sinks, water supply, and electric connections. A 15-inch burnisher and a 26-inch print trimmer, with trays, printing frames, and other necessaries have been added to the outfit.

It has been found that it is necessary to have an experienced operator to obtain the best results in radiographic work, no matter what kind of a machine is used and what methods are used in completing the photographic process. The following are the principal points to be taken into consideration in the production of good radiographs:

(*a*) Current generated and uniformity of same.
(*b*) Kind of tube used and state of vacuum.
(*c*) Region of the body to be radiographed and thickness of individual.
(*d*) Distance of tube from the body.
(*e*) Sensitiveness of the plate.

After exposure the process is comparatively simple, although some developers give better definition than others and the paper used for printing should be carefully selected. At this hospital the metol-pyro solution has been found to be the best developer and the solio paper has given the best satisfaction for printing purposes.

REPORT UPON INSANITY.

There have been 180 cases diagnosed as insane received at this hospital during the fiscal year. These cases have been cared for in the insanity ward, a small detached building on the eastern portion of the hospital grounds, which is well equipped for the care of such cases. Several times during the year the capacity of this small ward was exceeded and a few cases were cared for in the auxiliary wooden barracks. The ward for the care of the insane patients is in charge of a medical officer, who is assisted by two privates of the hospital corps. The patients are kept under observation at this hospital until a board, composed of three medical officers, is satisfied as to their condition, when those who are considered to be insane are sent to the Government Hospital for the Insane, at Washington, D. C., while those considered to be normal mentally are returned to duty or discharged as the case may be. A considerable number of soldiers returning to this country from the Philippines and diagnosed as insane, are found, upon arrival here, to be normal as regards their mental condition and are returned to duty, or, in the case of volunteers, discharged from the service.

The 180 cases diagnosed as insane received at this hospital during the year were divided as follows:

Regulars	96
Volunteers	78
Discharged soldiers	2
Prisoners	2
Civilians	2
Total	180

The following dispositions were made in these cases:

Transferred to Government Hospital for Insane, Washington, D. C	128
Returned to duty	34
Discharged on surgeon's certificate of disability	7
Discharged from the hospital	3
Mustered out with regiment	3

Transferred to Alcatraz Prison	1
Transferred to City Hospital, San Francisco, Cal	1
Died	2
Remaining in hospital for observation	1
Total	180

Diagnosis.—It has been exceedingly difficult in many instances to determine the exact form of insanity present in many of the cases, and it has been only after careful study and observation that the diagnosis could be determined. The 180 cases were divided as follows:

Acute melancholia	39
Melancholia simplex	11
Chronic melancholia	16
Acute or primary dementia	14
Secondary or terminal dementia	7
Primary delusional insanity	6
Chronic delusional insanity or paranoia	3
Alternating or circulating insanity	1
Acute mania	28
General paralysis of the insane	1
Epileptic insanity	1
Syphilitic insanity	1
Traumatic insanity	1
Morphomania	1
Monomania	2
Epilepsy (grand mal)	1
Nocturnal epilepsy	1
Insanity not confirmed	46
Total	180

During the year there have been 46 cases, diagnosed as insane received at this hospital in which the diagnosis was not confirmed. It is probably true that most of these cases, if not all, were insane at the time that they were transferred to this hospital, but the majority of them came from the Philippine Islands, and the voyage home, together with a more cheerful surrounding, resulted in the disappearance of the abnormal mental condition. Most of these cases were of the type of insanity in which the prognosis is good, and most of them were, without doubt, due to nostalgia and the depressing influence of campaigning in the tropics. Upon removal of this condition the return to the normal mental condition was rapid and complete. The diagnoses of the cases of insanity which were not confirmed were as follows:

Acute melancholia	15
Melancholia simplex	3
Chronic melancholia	1
Acute mania	4
Delusional insanity	1
Nostalgia	1
Neurasthenia	2
Chronic cephalalgia	2
Acute alcoholism	7
Chronic alcoholism	3
For observation	6
Total	46

Etiology.—The etiology of insanity in soldiers returned from the Philippine Islands is a subject which is at one simple and complex. Without doubt a large proportion of the cases which become insane have a hereditary taint which had not been discovered prior to enlistment. This, taken with the long distance from home, the intense heat of the tropical sun, constant harassment by an enemy which it is impossible to see, excessive use of alcoholics, and the depressing influences always present in a tropical climate, will account for the changed mental condition.

The influences just spoken of, even without the hereditary predisposition, are enough to produce, in a highly nervous individual, mild or even severe forms of insanity. It is safe to say, however, that the proportion of insanity in the Army does not exceed that in civil life in any large city, where the conditions of life approach the conditions found in the Philippines as regards social surroundings, etc.

It has also been found that the ratio of recovery in the case of soldiers returning from the Philippine Islands is much larger than that found in a corresponding number of individuals taken from civil life, and this goes simply to prove that the condition of insanity present has been only a temporary one, which rapidly disappeared upon transference to other conditions more favorable to the individual. Almost all of the cases of melancholia will be found upon examination to be due to nostalgia, and as a rule in these cases the prognosis is very favorable, provided the patient is transferred to the United States. It would be uninteresting and of no value to consider the etiology of the different forms of insanity present in soldiers, for all of them will be found upon examination to be due to one or more of the causes mentioned above.

THE FIRE.

Upon the afternoon of June 10, 1901, the northeastern portion of the hospital was destroyed by a fire which originated in the carpenter shop. One of the civilian employees of the hospital, without authority, was boiling paraffin over an oil stove, when it ignited, and before anything could be done the flames had spread to the inflammable material in the carpenter shop and to that portion of the hospital. The portion destroyed by fire included the patients' and hospital corps' dining rooms and kitchens; the medical, ordnance, quartermaster, and baggage storerooms; the carpenter and paint shops; ward F and a portion of ward G, with the tent hospital of forty-five tents. This fire involved a loss to the hospital of approximately $56,000. Since the fire a portion of ward G, which was partially destroyed, has been repaired and the fences on the north and east sides of the hospital,. which were either torn down or burned, have been replaced. Ward H has been refitted as a patients' kitchen and dining room, two ranges having been set up and the chimey in the ward altered. A temporary stairway has been built in the front of this ward for use in taking supplies from the storerooms to the kitchen. A short time after the fire wards I and J, which were slightly damaged and emptied in order to save their contents, were refitted and made ready for occupancy.

At the time of the fire a strong wind from the southwest was blowing and the flames spread with the utmost rapidity, and although the fire was fought by the fire brigades of the hospital, the post, and the city, it was impossible to save the northeast portion of the hospital.

The losses to the general hospital by fire were as follows:

Buildings	$35,000.00
Medical property	14,991.52
Medical property to be inspected and condemned	3,173.02
Quartermaster property	5,597.16
Ordnance and ordnance stores	1,251.77

MEDICAL OFFICERS.

During the year 103 medical officers reported to this hospital for duty. Most of these officers were detailed on temporary duty while en route to the Philippine Islands. The following dispositions were made:

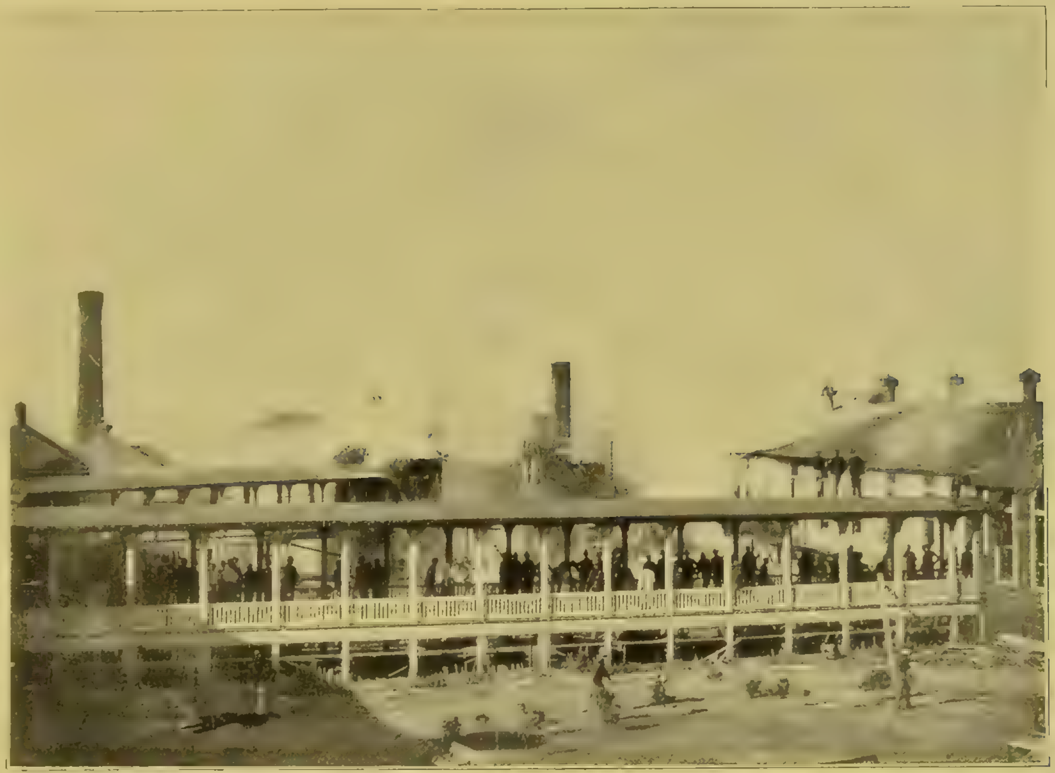
Transferred	96
Discharged the service	1
Sick	6
Temporary duty, awaiting transportation to the Philippine Islands	86

There have been 10 medical officers at this hospital during the year on permanent duty:

Regulars	3
Contract surgeons	7

POST-OFFICE.

Connected with the hospital is a branch post-office known as Station No. 1, Presidio. This office has proved of great convenience to the inmates of the hospital and has handled an immense amount of work during the year. The following tabulated statement of the money-order business from August, 1899, to July 25, 1901, published



ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., ON FIRE, JUNE 10, 1901.

by permission of the post-office inspectors, will give some idea of the large amount of business done at this office:

1899:	
August	$674.00
September	1,959.00
October	3,033.00
November	2,165.00
December	1,834.00
1900:	
January	1,564.00
February	1,355.00
March	2,323.00
April	873.00
May	775.00
June	2,081.00
July	1,228.00
August	1,698.00
September	5,708.00
October	1,188.00
1900:	
November	$1,112.00
December	1,270.00
1901:	
January	972.00
February	2,161.00
March	1,801.00
April	5,118.00
May	11,189.00
June	17,849.00
July	13,255.00
Total	83,185.00
Money orders paid and repaid	1,230.50
Total	84,415.50

In this period 2,525 money orders have been issued.

CONCLUSION.

In concluding this report, in which, owing to my performing the duties of chief surgeon of the department in addition to the administration of the hospital and its operative surgery, I have had to rely greatly on the reports of the medical officers in charge of the various departments, I desire to draw attention to the great harmony existing at the hospital during the year, medical officers, hospital corps, and female nurses vying with one another in making the institution the perfection of its kind. I am greatly indebted to Dr. Craig for the compilation of the data furnished, but particularly for his devoted and painstaking work in the bacteriological laboratory and at the post-mortem table, of which his report is a plain evidence. I have facilitated his work in every possible manner, principally by supplying him with a stenographer, which did away with the drudgery of writing.

Lieut. C. C. Collins, assistant surgeon, United States Army, has very intelligently filled the multiple offices of the executive, quartermaster, commissary, ordnance officer, and summary court, and deserves an ample share in the credit for the smooth working of the hospital. Capt. W. E. Purviance, assistant surgeon, was not selected by me as executive officer, because I needed his services in the supervision of the medical work of the wards, the examination of clinical histories, and consultation in medical cases. In addition to these I charged him with the presidency of the various boards for discharge, disposition of insane, etc., and he has had prepared under his supervision the final statements and discharges, as well as the certificates of disability, all of which required an officer of experience.

Lieutenant Hess, assistant surgeon, during his stay at this hospital, was a valuable assistant to Captain Purviance, and had in addition the charge of the voluminous muster rolls and clothing and descriptive books.

Dr. Clark, who had charge of the surgical wards, was of great value in his good judgment and in his correct enforcement of antisepsis, to which I owe the remarkable results obtained in surgery at this hospital.

Dr. William P. Banta has during the greater part of the year had charge of the X-ray apparatus and photographic work, and has made such improvements in equipment and its use that the radiographs produced in this laboratory are equal to any I have ever seen. Dr. Banta combined with this work the eye, ear, nose, and throat clinic, for which special facilities have been provided, and also the care and final disposition of the insane.

The other medical officers, Lieutenant Morse, Medical Department, Contract Surgeons McVean, Murtagh (now in the regular service), White, Barry, and Guitard, were more directly engaged in the service of the medical wards, and proved very zealous and satisfactory.

It would have been an impossibility to accomplish the great task of receiving in a hospital calculated to take care of 400 patients during a year over 5,000, feed, treat, and dispose of them according to the army system without devoted and intelligent assistants.

ARMY HOSPITAL SHIPS.

At the present time we have no army hospital ship. The *Relief* was used during the past year for service in the Philippine waters, but her great draft of water, which prevented her from entering many of the harbors and necessitated the transfer of sick for several miles in open boats, resulted in her transfer July 25, 1901, to the quartermaster's department as unsuited for special medical service.

An experiment was made in utilizing an army transport, the *Pennsylvania*, for the purpose of bringing sick men to Manila from outlying posts. This vessel left Manila October 5, 1900, with subsistence and quartermaster supplies for various southern garrisons and with accommodations for the return of 160 sick or wounded men. The hospital on the main deck consisted of four wards of 40 beds each, with dispensary, office, surgical dressing room, etc. Everything necessary for the welfare, convenience, and comfort of the sick was promptly furnished by the medical supply depot at Manila. This extemporized hospital ship brought back 155 cases to Manila on November 11, after a voyage of 2,322 miles. Among the cases were 46 of dysentery, 19 of malarial fever, 13 of diarrhea, 13 of wounds, and 6 of insanity. In every case there was marked improvement, a large proportion of the sick men being practically well by the time the vessel reached Manila, and no death occurred. It was deemed worthy of remark by the commanding surgeon, Maj. John S. Kulp, surgeon, United States Volunteers, that even the cases of insanity with no other treatment than generous food, illustrated papers, light airy surroundings, and constant companionship, improved so rapidly that any special guard over them seemed unnecessary before the end of the voyage.

The great objection to this ship was her draft of water, which prevented her from entering harbors and rendered difficult the transfer of sick from shore to ship.

The success of this voyage, notwithstanding unsatisfactory conditions and the prior successful use of the *Relief* for a similar purpose, originated the idea of making use of the supply trips of the latter vessel in giving the benefits of a sea voyage to invalids in the Manila hospitals who evidently were not improving by their hospital treatment. On the first trip of this character the *Relief* left Manila March 31, 1901, with 140 invalids. Fifty-one were collected on the trip. A careful examination on the return to Manila showed 29 returned to duty, 100 markedly benefited, and 60 somewhat better, but with no decided improvement. The change of air and food, the cool nights, and constant change of scenery had a decided effect for good on the majority of these cases. On several such voyages since then the *Relief* has been of material benefit to the sick, but always under the great disadvantage of her inability to come close to shore. These voyages demonstrated that a suitable light-draft ship devoted solely to the interests of the medical department is a necessity. Authority was therefore received from the Secretary of War for the purchase of a ship as a hospital transport, and measures are now on foot to accomplish this object, which will satisfactorily solve the questions of furnishing the departmental and district military hospitals in the Division of the Philippines with medical supplies, and of promptly removing such sick and wounded men as require transportation to Manila.

In a similar way daily outings have been given to convalescents from the Manila hospitals on the Pasig River and Laguna de Bay on the hospital launch *New York*, which carries conveniently about 50 persons. A regular roster from her dock has been established, and each hospital in turn sends its quota of doctors, female nurses, and patients on successive days, the trip occupying three to four hours. The results have been very gratifying, even this little outing going a long way to relieve the tedium of the necessary confinement in hospital and hastening convalescence in many cases.

HEALTH OF THE ARMY.

The health of the Army must be regarded as having been unusually good during the calendar year 1900, the medical statistics of which are tabulated in the present report. To give a proper valuation to this statement the statistics of our Army from the time of the civil war must be taken into consideration. For many years after that war the admissions to sick report, discharges for disability, and deaths were somewhat similar to those reported during the past year, but then they were the result of service in the garrisons of the United States, while now they result from what practically has been war service in the Philippine Islands. Sanitary improvements in the condition of the soldier gradually lessened the rates, year after year subsequent to the civil war, among the troops in the United States, until in 1894 the admission rate from all causes fell to 1089.73 per thousand of strength. The lowest admission rate for disease was 830.65 in the year 1896; the lowest death rate from all causes was 5.11 per thousand of strength, 3.14 having been the rate for disease, both of which were recorded in the year 1897—the year preceding the great change in the sanitary environment of the soldier which resulted from the outbreak of the Spanish-American war. Following that outbreak, we had heavy rates of sickness and mortality, due to the exposures of active service in Cuba, Porto Rico, and the Philippine Islands. For a short time these rates were in excess of those of the civil war when at their worst, but the sanitary knowledge of the present time, put to energetic practical use, speedily caused a cessation of these excessive war rates, leaving the ratios still as high as those which prevailed in the garrisons of the United States for a number of years after the close of the civil war.

The increase in the ratios of admissions to sick report, discharges, and deaths during the past year over those of the years 1894–1897 is due to the relatively large proportion of our military force which served under war conditions in the Philippine Islands and China. But for this, the rates given by the Army would have made a very satisfactory record, as those given by troops serving in Cuba, Porto Rico, and the United States were by no means heavy.

The admission rate for all causes in the Army, volunteers and regulars, with a mean strength of 100,389 in 1900, was 2311.81 per thousand of strength, as compared with 2178.06 in the previous year; but during the year 1899 only 39,280 men out of a total of 105,546 were serving in the Philippines, while during the past year 66,882 of a total of 100,389 were thus serving. This is an important point to remember in considering the sick rates of the two years.

The troops serving in the United States during the year 1900 (mean strength 20,690) had an admission rate of 1510.97 per thousand of strength, as compared with 1677.51 during the previous year—1242.87

from disease and 268.10 from injury, as compared with 1496.84 and 180.67, respectively, during 1899. The ratio for discharge was 39.29 per thousand of strength, as compared with 26.95 during the previous year; 32.52 of this rate was for disease and 6.77 for injury. The death rate did not differ much from that of the previous year. It was 7.78 from all causes per thousand of strength, as compared with 7.89 in the previous year; 4.83 from disease, as compared with 6.56 and 2.95 from injury, as compared with 1.33.

In the Philippine Islands, with a mean strength of 66,882, the admission rate was 2621.96, as compared with 2395.52 in the previous year, this increase being mainly due to disease among the volunteers, the ratio for which rose from 1859.21 to 2761.79. The regulars, on the other hand, showed a marked decrease in the ratio of admissions for disease, which fell from 2454.10 to 2197.73. Two-thirds of the admissions for disease were caused by malarial fevers and diarrheal diseases. The discharge rate among the volunteers, 12.98 per thousand of strength, was smaller than that of the regulars—22.46—probably because the volunteers were in expectation of a return home for muster out at an early date. The deaths from all causes amounted to 28.75 per thousand of strength, as compared with 30.58 in the previous year. Disease occasioned 20.26 deaths, the principal cause of the fatalities being dysentery, which, with other intestinal diseases, gave a rate of 9.08. The rate from injury amounted to 8.49.

The death rate in China was large, 47.76 per thousand of strength, 23.62 from disease, and 24.14 from injury, but fortunately the mean strength for the year was small, 1,947 men.

From the close of the calendar year 1900 to the latest reports, the health of the troops in the Philippines has been steadily improving. The chief surgeon has reported a progressive diminution in the nonefficiency of the command from disease and injury. In July and August, 1900, the nonefficiency constituted 9.47 and 9.58 per cent of the strength. From January to June, 1901, the nonefficiency was less than 7 per cent, the lowest rate 6.12 per cent, having been recorded in March. Intestinal and gastric diseases, including dysentery and typhoid fever, gave 34.22 per cent of the total sickness, malarial fevers 15.23 per cent, and venereal diseases 13.10 per cent. Typhoid fever, which scourged our camps in 1898, appeared only sporadically, constituting merely 1.78 per cent of the total sickness. Most of the malarial cases were mild and made little or no figure in the mortality returns. Smallpox, so prevalent and deadly in the early occupation of the islands, has almost entirely been suppressed. Dysentery, constituting 13.44 per cent of all cases of sickness, is the dangerous disease. Bubonic plague, although a subject of importance to the medical officers, members of the board of health of Manila, and to those temporarily assigned for duty with the board as inspectors, on account of its prevalence among Chinese and Filipinos, appears to have given but little anxiety to medical officers serving with troops, as during the year only one case was reported as having occurred in the army in the person of an enlisted Chinese cook of the Twenty-seventh Infantry at Camp Stotsenberg, near Manila, the infection having undoubtedly been contracted in the city. Quarantine and disinfection prevented any extension of the disease.

The health of the troops serving in Cuba was excellent during the year. With a mean strength of 8,690 the admission rate was 1873.07

as compared with 2749.74 in 1899, the rate for disease having been 1586.19 as compared with 2537.98. Discharges for disability amounted to 16.57 per thousand of strength as against 20.25 during the previous year and the death rate from all causes was 9.78 as against 18.30 in 1899. Malarial diseases contributed 581.35 to the admission rate, but the death rate from these cases was only 1.04 per thousand of strength. Dysentery and diarrheal diseases constituted 166.75 of the admission rate, but only 0.58 of the death rate. But for the occurrence of yellow fever the death rate from the disease in this command would have been only 4.72 per thousand of strength. One hundred and forty-four cases were reported, of which 32 were fatal, giving a death rate of 3.68 per thousand of strength, the rate for all diseases being 8.40 and for all diseases and injuries 9.78. Since the close of the calendar year the health of the troops has continued good. Under date of July 22, 1901, the chief surgeon reported that since November, 1900, the only cases of yellow fever that had occurred in our military garrisons were the nine cases in the persons of men who were experimentally inoculated by infected mosquitoes at Quemados. See page 177.

Maj. V. Havard, surgeon, United States Army, chief surgeon, Department of Cuba, makes note of the fact that the admission rate for disease in the garrisons of the eastern half of the island of Cuba is nearly double that of the troops serving in the western half. This is due to the greater prevalence of malarial fevers and diarrheal diseases in the eastern provinces. See page 145.

As a result of the American occupation of the island every city has its health officer and every inland town where troops are stationed has had its sanitary condition more or less improved by the energy of the post commander and medical officer, the latter acting as a sanitary inspector for the municipality.

In Havana the work of sanitation has been prosecuted with vigor by Maj. W. C. Gorgas, surgeon, United States Army, the chief sanitary officer. His systematic efforts to destroy mosquitoes, which are now recognized to be the chief agents in the propagation of malarial and yellow fevers, have achieved the most gratifying results. During the first six months of 1900 the mortality from malarial fever was 247; during the last six months, 97, and during the first six months of 1901 only 75. As to yellow fever, there were 24 deaths in the city during the first six months of 1900, 285 in the last six months, 17 in the first three months of 1901, and none in the three months ending June 30, 1901, during which the machinery of the health department for the control of the disease under our recently discovered knowledge as to its propagation became perfected. Any further improvement in the sanitation of the city must depend on an approved sewerage system and on the gradual improvement of the local sanitary conditions.

The medical record of the troops in Porto Rico for the year 1900 is an excellent one, comparing favorably with that of the troops serving at the home stations. With a mean strength of 2,180 for the year, the admission rate for all causes of disability was 1,577.98, as compared with 2,522.40 during the previous year. The rate for disease was 1,397.71 and for injury 180.27, as compared, respectively, with 2,255.97 and 266.43 in 1899. The discharges for disability amounted to 15.14 per thousand of strength, compared with 19.85 in the previous year. These discharges were mainly for consumption and diarrheal diseases. The death rate was only 5.05 per thousand of strength, as against 11.27 in 1899. All the deaths were the result of disease. It will be observed that this death rate is lower than the lowest recorded death rate in our Army—5.11 per thousand in 1897 in the carefully supervised garrisons of the United States prior to the sanitary change made by the outbreak of the Spanish-American war. Venereal diseases caused 367.88 of the admissions per thousand of strength. Were these deducted the admission rate for disease would fall to 1,029.83. Malarial diseases had an admission rate of 247.25 and diarrheal diseases 148.17 per thousand of the strength.

Special attention has been paid by medical officers during the year to the purity of the water supplies used by their commands. As a rule all doubtful supplies have been boiled before use for drinking. Orders and circulars have been issued by post and company commanders concerning the danger from typhoid fever, dysentery, intestinal parasites, and other abdominal diseases by the use of impure surface water. In the Philippines the Waterhouse-Forbes sterilizers described in my report for the year ended June 30, 1899, pages 215-225, are in use throughout the islands and give the utmost satisfaction, although care in their management must be taken to insure a thorough sterilization. With troops new to the islands the utmost care on the part of officers is necessary to prevent dangerous results from the use of impure water.

The following letter, dated May 22, 1901, from Brig. Gen. A. W. Greely, chief signal officer, United States Army, to the Adjutant-General of the Army, shows that service in the Division of the Philippines does not involve a large noneffieiency from sickness if the men are intelligent and take care of themselves:

> SIR: As a matter of official interest to the Secretary of War, the Commissary-General of Subsistence, and the Surgeon-General, I have the honor to state that the official reports of Lieut. Col. James Allen, chief signal officer, Division of the Philippines, show that at the end of February, 1901, there were serving in the Philippines 31 officers and 517 enlisted men of the Signal Corps, of whom there were reported sick no officers and 7 enlisted men.
>
> It may be added that the duties of the enlisted men of the Signal Corps are such as to cause them to serve at widely separated posts under adverse conditions.
>
> First Lieut. Leonard D. Wildman, commanding Company H, who reports only 1 man sick out of an aggregate of 113, says: "The health of the command is unusually good. * * * It is largely due to the care the men take of themselves and the fact that the ration, supplemented by native vegetables, is a very wholesome one. Nearly every man in the company has had his turn at line work in the field or as signalman with some expedition. The variety of work is also accountable in a measure for their health. A few men, however, have broken down and have been brought to the headquarters and given lighter work and more exercise. The operators, who are on duty twenty-four hours per day, are the first to give way. Men who have the hardest work and most exercise seem to be well."
>
> This surprising condition of health is practical evidence of the efficiency of the commissary and medical departments when supplemented by the supervision of a careful commanding officer. It is a record of the condition of military affairs in the Philippines, of special interest at this time, when many unwarranted adverse criticisms of the Army are being made.

REPORT OF COL. CHARLES R. GREENLEAF, ASSISTANT SURGEON-GENERAL, UNITED STATES ARMY, CHIEF SURGEON DIVISION OF THE PHILIPPINES, MANILA, P. I., MAY 31, 1901.

I have the honor, prior to my departure for the United States, to submit a report of the operations of the medical department in the Division of the Philippines for the period ending May 31, 1901:

HEALTH OF THE ARMY.

The health of the troops continues to be good, and the ratio of noneffectives to the whole strength has still further diminished. The average for the seven months covered by my last report was 8.84 per cent; for nine months ending March 31 the average is 7.52 per cent; the month of August gives the highest, 9.47 per cent, and March the lowest, 6.12 per cent. As the reports of sick and wounded for April are not all in at the time this report is made, accurate statistics are not available for that month and for May.

Aggregate numerical sick report, by months.

	Strength.	Noneffective.	Per cent.
1900.			
July	61,392	5,811	9.47
August	60,702	5,817	9.58
September	64,225	5,451	8.49
October	67,866	4,977	7.33
November	68,436	4,937	7.21
December	68,465	4,682	6.84
1901.			
January	68,043	4,297	6.37
February	63,127	4,077	6.46
March	56,791	3,478	6.12
Average	....	....	7.52

The principal diseases for the same period give the following rates:

Disease.	Average per cent of total sick for period.	Maximum monthly.	Minimum monthly.
Typhoid fever	1.78	2.23	1.25
Malarial fever	15.23	21.45	10.48
Dysentery	13.44	15.96	11.92
Diarrhea	12.85	19.01	6.91
Other intestinal	2.63	4.43	1.46
Gastric	3.54	4.95	2.26
Wounds and injuries	10.31	12.12	7.68
Venereal	13.18	20.42	8.97

Intestinal and gastric diseases, including dysentery and typhoid fever, therefore give 34.22 per cent of total sickness; malarial fever and sequelae next with 15.23 per cent, and venereal diseases third with 13.18 per cent.

The great improvement in the effective rate to total strength is to a certain extent, no doubt, due to still greater care in sanitation, but the greatest factor is that the regiments have been gradually weeded of their weaklings and chronic invalids. The immature youths, the hard drinkers, and the recruits with inherited or acquired weakness of constitution, have gradually, after repeated appearance on the sick report, and running the circuit of various hospitals, been sent to the United States. Service in the Philippines shows on a grand scale the operation of the law of the survival of the fittest, and the volunteer troops give us the best example of this, because they have received no recruits since their arrival in the islands. The seasoned men who pass a year in the Tropics, of strong constitution, observing the ordinary hygienic rules, and old enough to be moderate in their appetites, should show a small sick rate were it not for two adverse factors.

The first is the inevitable undermining of the strength of the most robust by continued service in the Tropics, and the second is the increasing prevalence of venereal diseases.

The most energetic and stalwart American after a year of service here loses energy, strength, and ambition. He performs what work his duty demands more or less half-heartedly and with a draft on his vital energy that he can actually feel at the time. Slight ailments, to which a second thought would not be given in the United States, are felt out of all proportion to their severity. The most valuable work of the medical officer with troops in camps and garrisons consists of judiciously advising and treating this class of cases—the slight ailments of men who do, or are striving to do, their full duty and who honestly dislike their names to appear on the sick list.

Typhoid fever has not existed as an epidemic anywhere. A few sporadic cases occurred from time to time at different places, and do not appear to have been occasioned by neglect on the part of medical or line officers. Individual carelessness on the part of men, drinking other water than that sterilized and provided for them, and consuming native-made lemonade, ice cream, etc., has probably caused typhoid fever in great part. The average, 1.78 per cent, of the total sickness for the period is a decrease, which indicates good sanitation and on the whole is satisfactory.

Malarial fever shows as usual the highest rate, although its average, 15.23 per cent, is a decrease from last report. I do not think that the actual prevalence of malarial fever is indicated by this figure, as many men have occasional slight attacks who do not appear on sick report at all.

The use of the mosquito bar is general and the men understand and appreciate the fact that it prevents the inoculation of malarial poison by mosquitoes.

The very great majority of malarial cases are comparatively mild. Pernicious fever with fatal results does exist in some parts of the island, but such places are nearly uninhabited and avoided by the natives. The nature of this malignant fever is not yet understood by us.

Dysentery does not show much variation, with an average of 13.44 per cent of all sickness. I believe there is a real decrease, notwithstanding the fact that the figures are a little higher than last year. More microscopes are now in use throughout the provinces and many cases are now detected at the outset that might have, under conditions of active field service, been classed as diarrhea. The detection of the amœba coli is very important, as tropical dysentery is apt to be very deceptive at the beginning.

In diarrheal and gastric diseases there has been a slight increase in proportion, due, I believe, to long service in the Tropics. Most of the slight troubles of the well men who are doing full duty come under this head, and few escape an occasional day or two on sick report with a diarrhea or slight gastric derangement. Many of these cases are probably caused by intestinal parasites, of which there are many varieties in the Philippines. It is difficult to detect some of these without microscopical examinations, and as serious illness is rarely produced by them other than the amœba dysenteriæ it probably happens that they often escape observation.

There was one case of bubonic plague in an enlisted Chinese cook of the Twenty-seventh Infantry, United States Volunteers, at Camp Stotsenberg, near Manila, undoubtedly contracted in the city. Strict quarantine and thorough disinfection prevented any extension of the disease, and the patient recovered.

Smallpox has existed in much less degree than before, but has not yet disappeared totally. Vaccinations have been repeated where unsuccessful as often as ten times during a year's time; the fresh lymph prepared in Manila from caraboa calves acts promptly with a characteristic vesicle and causes little suffering. Some complaint has been made of its nonefficiency at remote stations, and as the difficulty in this climate of transporting lymph promptly and keeping it cool is very great it is probable that time and heat soon cause the virus to deteriorate.

It is an interesting fact that heat stroke generally so much feared in the Tropics is practically unknown here; men often drop out on the march overcome by heat, but fatal stroke and lasting heat exhaustion is very rare.

Wounds and injuries show very little variation, and the proportion of these inflicted by the enemy remains large enough to indicate that, although large movements of troops have ceased the army has, nevertheless, been engaged in about as much marching, skirmishing, and fighting as ever until the last two or three months. From August 1, 1900, to April 30, 1901, in addition to 165 killed in action, 24 died of wounds and 366 received wounds not fatal.

The transports *Meade*, *Indiana*, and *Hancock*, arriving in April, brought many cases of mumps and measles, and each succeeding vessel seems to have these diseases aboard. In this connection it would be interesting to know if the clothing supplied to recruits at Presidio possibly carries this infection from having been made in sweat houses or crowded tenements.

The steady increase in venereal diseases among our troops, from 8.97 per cent in September, 1900, to 20.42 per cent of total sickness in April, furnishes ground for the greatest apprehension, and is an item not exceeded in importance by any other affecting the health and efficiency of the army in the Philippines.

Lest our forces become seriously crippled and an irreparable injury be done the people of these islands by those whose object is to help and elevate them, the subject must be looked at squarely in the face and dealt with as any other contagious disease.

Syphilis is fortunately not the most prevalent of these, and exists in the proportion of about one out of every seven cases of venereal disease. Gonorrhea of a very obstinate nature, and chancroid are about equally prevalent. The latter causes in nearly every case complete noneffectiveness on account of suppurating bubo. A soft sore, very minute, often touched with caustic by the man himself, may heal so promptly that the scar can scarcely be seen; nevertheless a bubo seems inevitable, requiring treatment in hospital and operation.

Venereal disease has of course always existed in Manila and the larger seaports of the Philippines, but much has been imported into Manila by women from Europe, America, and Japan, and by soldiers and sailors.

The native woman outside of the city has hitherto as a rule been free from disease, but it is she who, when infected, will be at once the greatest sufferer and the greatest menance to the public health, because she will have neither means, knowledge, nor opportunity requisite to a cure.

This class of disease is spreading from Manila as a focus into the provinces, and as amicable relations are now nearly universal between Americans and natives it is likely that a large number of women will be infected, and with little prospect of cure.

A segregation of this class of women in Manila to a certain part of the town, a supervision of their health, and a duly recorded treatment of the diseased, should be systematically carried out, and stringent measures are now being taken by the Manila board of health in the matter.

Orders directing bodily inspection of all enlisted men at regular intervals have been issued, with the intention of detecting all diseased soldiers and treating them at a special hospital. Los Banos, on Laguna de Bay, possessing hot springs closely resembling, in the composition of the water, the hot springs of Arkansas, has been selected as a suitable place for the treatment of syphilitics, and a small number are now there undergoing treatment. Maj. J. C. Minor, surgeon, United States Volunteers, who is in charge, and who practiced at Hot Springs, Ark., for years, says: "The water is apparently unlike all other natural hot waters except that of the hot springs of Arkansas, in that to the senses it is essentially a pure, sparkling, palatable, and highly assimilable hot water. Should the analysis show no great quantity of mineral, there is little doubt but that its therapeutic value as an emunctory stimulant will equal or excel that of Hot Springs, Ark."

The main well has an apparent discharge of 3,600 gallons per hour of water of the temperature of 212° F.

Several buildings, some antiquated tubs, 3 large tanks, and 3 vapor closets are on the spot, relics of the Spaniards' hospital. There are no water connections or sewerage, and much repairing, plumbing, etc., will be necessary. The details of the whole plan are being as rapidly as possible carried out.

It is too soon to give, as yet, the results of treatment by the waters.

MORTALITY.

It is gratifying to report a steady decrease in deaths.

This seems to be mainly due to the falling off in the number of those killed in action and died of wounds, but the figures showing deaths from disease give a decrease in some important particulars, and at least a maintenance of former rates in all others except dysentery.

It was expected that the death rate from disease would increase with the length of service of troops on the islands. That this has not done so on the whole for the last nine months is very satisfactory.

The following summary gives total mortality from August 1, 1900, to April 30, 1901, and the percentages of last report are added for comparison:

Cause of death.	Officers.	Enlisted men.	Per cent of total mortality.	Per cent last report.
Killed in action	13	252	0.1673	0.2090
Died of wounds	1	23	.0243	.0462
Injuries	4	50	.0547	.0273
Suicide	....	21	.0212	.0201
Drowned	1	58	.0597	.0402
Variola	....	34	.0346	.0894
Typhoid fever	2	65	.0679	.0814
Dysentery	2	241	.2462	.1980
Malaria	....	49	.0497	....
Other diseases	8	263	.2745	.2884

An average of 3.6 deaths daily as compared 4.7 of last report.

The mortality rate for the period is about 20.45 per 1,000 per annum; in the last report it was 26.7 per 1,000 per annum.

There are some especially noticeable features in the above table.

The proportion of officers killed in action is very great.

Deaths from wounds received have diminished nearly one-half from last year.

This indicates that in the exigencies of the active work of recent months, the greater facilities in personnel of medical officers and hospital corps have allowed of better and more prompt attention to the wounded.

Dysentery gives a large increase, and this bears out the belief that every case of amœbic dysentery should be sent home at once, when the diagnosis is made. It would also appear that length of service does not give any immunity from dysentery, but rather seems to predispose to its acquirement.

Suicides remain at nearly the same ratio.

The mortality for variola has decreased 60 per cent of former rate. In typhoid fever it has diminished 28 per cent.

Malarial fever and results give a very small mortality, notwithstanding their great prevalence. It is commonly observed in the provinces that the natives have "Calentura" as severely as American soldiers, and with a considerable mortality. As outpost duty diminishes and the men can sleep in their cots with mosquito bars every night, malaria will probably diminish very much.

TRANSFER OF INVALIDS TO UNITED STATES.

This constant and unavoidable drain on the strength of our forces remains large, and although the greatest care to choose the subject for transfer has been taken, and each patient is carefully examined by a board of medical officers, the figures show that the loss from transfer for treatment to the United States will be a very large factor in estimating the strength of troops to be kept or afterwards sent for duty in the Philippines.

It has been found poor economy in many cases to keep a soldier here who has apparently recovered from an attack of dysentery and has been returned to duty from hospital, with hardly an exception again to be taken sick. The amount of duty performed by a sick man between his stays in hospital is entirely incommensurate with the ultimate danger to his health or life. It is best to send such a case to the United States as soon as the disease is diagnosticated.

Patients with tuberculosis should not stay in the Philippines.

Malarial fever is generally completely recovered from. Nearly all of the well men of a year's service or more have had it, but men saturated with the malarial poison from service in especially unhealthy localities, bloodless and weak, with torpid livers and enlarged spleens, never completely recover here and should be sent home. Such patients furnish fertile soil for dysentery. Experience shows that a lowering of the physical standard for recruits is an expensive luxury, when such men are sent to the Philippines. More especially does this apply to the enlistment of minors. Even a strong, athletic youth, with the measurements of a man of 21, and free from blemish, is seldom a desirable recruit for tropical service. In September I noted that out of 445 convalescents to be sent to the United States for treatment, 129 were under 21, or 29 per cent of the whole number. Such boys are particularly prone to typhoid fever; in fact, 18 or 19 is the favorite age for typhoid fever all the world over. They seem to have malarial fever more severely and become cachectic more rapidly than older men. When the first sense of novelty and adventure wears off the boys lose heart and become homesick; in short, they are more imprudent concerning their own health and less resistant to the disease-producing agents.

An ideal army for the Tropics would consist of men between 25 and 40 years of age.

From August 1 to April 30 the number of invalids sent home for treatment was as follows: Regulars, 1,132; volunteers, 2,861.

These figures are very misleading in the case of volunteers.

The rate sent home for regulars has increased over my former report by just about enough to be accounted for by the lengthened stay of the regular troops in the islands.

In the volunteers, as the time of their muster out drew nearer, it was foreseen that transportation here would be insufficient for all the sick toward the last, and orders were issued to send in to Manila all sick volunteers, even those in regimental hospitals, for transfer to the United States. Many of these cases were trifling and no doubt recovered before a week out of harbor had passed.

The rate of men of the volunteers who should have been sent home under any circumstances, because of imperative need to save life or restore health, would not differ greatly from that for regulars.

The system inaugurated February 25, 1900, of sending men recommended for discharge on surgeon's certificate of disability to Hospital No. 3 for observation has worked satisfactorily. Malingering is detected and the papers are properly completed before the men leave for final discharge at San Francisco. Maj. John S. Kulp, surgeon, United States Volunteers, has supervised this important work.

From May 31, 1900, to April 27, 1901, including 46 men in Hospital No. 3 at the latter date awaiting transfer, there were sent home 526, as follows:

Disability contracted after enlistment in line of duty	380
Disability contracted after enlistment not in line of duty	43
Disability self-inflicted after enlistment in line of duty	10
Disability self-inflicted after enlistment not in line of duty	5
Disability contracted prior to enlistment not in line of duty	88
Total recommended for discharge	526

Cases classified.

Circulatory system	34
Nervous system	60
Digestive system	32
Respiratory system	16
Muscular system	5
Ocular	36
Nasal	1
Aural	35
Venereal	36
Congenital	6
Gunshot wounds	118
Injuries	147
Total	526

This is a large number to lose in less than a year's time, but every care has been taken to select cases for discharge, and it is not likely that the figures will be improved upon as new troops come in.

Of insane soldiers, 121 have been sent home since August 1; of these, 72 were regulars and 49 volunteers. These cases are of melancholia and simple acute mania, and the causes are to be looked for in the general conditions surrounding soldiers' life in the Philippines acting on predisposed men.

It is believed that nearly all are of a temporary nature, and are cured by return to their homes, but I have no reliable statistics on this head, and can not speak with certainty.

Contrary to general belief in the United States, there is not much disability from alcoholism. The habits of the enlisted men differ but little from those in the United States. An exciting cause of a certain proportion of the insanity, as well as the origin of a large part of the drunkenness in the provinces, is the use of the so-called "vino" of the natives, a crudely distilled alcohol, causing very rapid intoxication, which is rather easily recovered from without suffering when a moderate amount is taken. In great excess it causes wild delirium, unconsciousness, and sometimes death, and in habitual users a deterioration of the mental faculties, delusions of persecution, attempted suicide, and aphasia have been observed.

HOSPITALS.

All of the Manila hospitals have been in use during the period covered by this report, and no one could have been dispensed with. In January and February the accumulated sick of the volunteer regiments were collected in Manila and sent home prior to departure of their regiments. I then decreased the bed capacity of the Manila hospitals one-third, and still further decreased the quota of medical officers at the hospitals. As the movement of the sick homeward came abruptly to an end, owing to lack of room on transports, and other sick began to accumulate, I was compelled again to increase the bed capacity of these hospitals. There seems no probability in the near future that any one of these hospitals can be discontinued. They are all modern in equipment, as well as are the departmental hospitals, some of which compare in equipment and size with the hospitals in the city. The regimental hospitals, of varying capacity, have fulfilled their purpose as emergency hospitals, and most cases of ordinary severity are now treated throughout with the regiment. Some of these compare very favorably with the old one and two company post hospitals in the western United States; many are merely extemporized, and as their usefulness depends on their being available for a large part of the regiment, it sometimes happens a newly repaired, neat, and quite complete regimental hospital is rendered nearly useless by the still further breaking up of troops into small detachments, and a post of three or four companies drops to a garrison of thirty men or so.

It is manifestly impossible to establish anything of the nature of a complete post hospital at every station occupied by troops. The present arrangement is sufficient for present needs.

When the locations for permanent garrisons are finally chosen, on the establishment of peace, the regimental hospital will be a thing of the past.

Under existing regulations the management of the subsistence of hospitals is a constant source of embarrassment and worry. Three distinct messes must be run, exclusive of the private mess of the officers, viz, patients, hospital corps, and nurses. The patients must be still further divided into two classes—those drawing regular rations and those sick enough to use the 40 cents per day allowance. While this, with infinite trouble, can be and is done at the large hospitals, it is utterly impracticable at the small. There is inevitable mixing of the two rations, and endless opportunity for the misuse of the special allowance for the sick. The remedy to my mind is simple—to reduce the allowance to 30 cents per day and allow the sick, nurses, and the Hospital Corps to subsist upon it. I believe this would result in a real saving to the United States. The argument that men of the Hospital Corps would thus receive a better and more costly ration than enlisted men of the line is met by the well-known facts that small squads can not make savings in anything like the proportion that company messes can, and that any saving under this allowance would revert to the commissary department.

The Emergency Hospital, established July 25, 1900, for the purpose of extending emergency treatment to any person in Manila needing it, has been in satisfactory operation, under the charge of Maj. W. F. Lewis, surgeon, United States Volunteers, and is doing much to relieve suffering and expedite the prompt treatment of both injuries and disease.

In addition to emergency work proper the hospital receives all patients among soldiers, citizens, and employees arriving in Manila by inter-island boats, and attends to their transportation to the proper hospitals. A daily sick call is held, and Government employees, including metropolitan police, are treated. A hospital steward and four privates of the Hospital Corps are on duty, with one ambulance, and every telephonic call day or night is answered. From July 25, 1900, to April 24, 1901, 2,385 cases were entered on the record, divided as follows:

Regular troops	384	Volunteer troops	536
Employees:		Civilians:	
American	538	White	209
Filipinos	273	Filipinos	241
Chinese	71	Chinese, etc	33

In response to a cablegram from the Adjutant-General of the Army to the commanding general of the Division of the Philippines, the full equipment of a 100-bed hospital was shipped to Nagasaki on the U. S. Army transport *Sheridan* in January. A sufficient personnel of officers and Hospital Corps accompanied, with Capt. I. W. Rand, assistant surgeon, United States Army, in command. As no instructions were received from Washington regarding the future use of this hospital, it is assumed that its establishment is for the purpose of caring for the sick and wounded on passing transports who are too ill to proceed farther on the journey to or from the United States.

The work of the new army pathological laboratory has proved of incalculable value in clearing up doubtful diagnoses, and in putting the study of the diseases of the Philippines on a scientific basis, and indicating lines of treatment best calculated to cure. It has been in sole charge of First Lieut. R. P. Strong, assistant surgeon, United States Army, who, as president of the board for the investigation of tropical diseases, prepared, at my direction, and issued in February the first number of a series of circulars on tropical diseases.

The primary object of this series of circulars is to furnish physicians arriving in the Philippines with a summary of the diseases to be found here.

The first circular dealt with animal parasites found in the human intestines in the Philippines; the second with dysentery, both amœbic and infectious, and the third with bubonic plague, by First Lieut. William J. Calvert, assistant surgeon, United States Army, a member of the Manila board of health.

SANITATION.

Greater interest is taken and more intelligently by both officers and enlisted men in the work of sanitation, notwithstanding that the prevailing diseases keep at about a constant rate without much change from last year.

Less than two years ago the volunteer regiments were raised in the United States, of men ignorant of the first principles of military service; now they are all either already mustered out of service or on their way home for that purpose. After promptly losing their immature, dissipated, and imprudent members in the first few months of their service here, these regiments, prior to leaving the Philippines, were about as healthy and physically efficient a lot of men as could possibly be expected after a year and a half of service in the Tropics. The experienced soldier instinctively observes most of the cardinal rules of personal and local hygiene. It has been ceaselessly reiterated to him that he must carry out certain simple and well-defined hygienic regulations or else sickness and death would follow. The proposition was treated by him at first with all the notorious indifference of healthy men to such advice, but it was not long before its truth was only too well demonstrated by the loss of his comrades, or perhaps his own severe illness, and soon the advantages of living with sanitary surroundings, of drinking pure water, and sleeping under mosquito bars were appreciated by him. When this appreciation once is possessed by the enlisted man he is about as much of a practical sanitarian as we may expect to find him, and even so much he only learns in months or years, a space of time inversely proportional to the severity of his experience.

The use of absolutely pure water is probably of more importance in this country than the observance of all other rules of sanitation combined; and as typhoid fever, dysentery, and the presence of innumerable intestinal parasites originate almost entirely from drinking bad water, it would seem we should in great part eliminate them from our list of diseases.

Circulars and orders have been issued repeatedly, requiring commanding and company officers to use every effort to provide a supply of pure water for their commands, and the monthly sanitary reports show that this is done at all stations in the archipelago. The Waterhouse-Forbes sterilizer is in operation throughout the islands and gives satisfaction, although care in its management must be taken to insure that the water passing through is sterilized. The necessities of field service often require troops to drink bad water, and when men visit Manila they seldom get other than that drawn from the city mains, which is by no means above suspicion. Very few of the hotels, boarding houses, and saloons of Manila provide sterilized water for their guests. Impure water is often used by the natives in the making of ice cream, lemonades, and other soft drinks, which they sell to the troops. A certain percentage of water-borne disease is probably acquired this way; also by the use of badly washed green garden produce. With new troops coming here the utmost vigilance on the part of medical officers is required to keep the sanitary condition even up to its present standard. New men must be broken in and acclimated, and the medical officers must strain every nerve to minimize the inevitable object lessons of death and disease before this is accomplished. Daily sanitary inspections by medical and company officers, of hospitals and barracks; weekly, of the command, by company commanders; and monthly, with reports, by surgeons, should suffice to keep a garrison in good condition.

The inspections by district chief surgeons are of great value, as they have opportunities for comparisons which enable them to give useful advice to officers under them. To superintend the entire system, and to make special inspections himself when the importance of the occasion requires it, the services of an experienced and capable medical officer, with the legal status of an inspector, and not merely detailed for duty, are imperatively needed; he should have the inherent authority of an inspector-general in his own field, and it is earnestly hoped that necessary legislative action on this point will be taken. During the period covered by this report, Maj. L. M. Maus, surgeon, United States Army, performed much valuable work in this direction, including a visit to Benguet Province, in Northern Luzon, to report upon its suitability for a great sanitarium, where soldiers invalid from tropical service in other parts of the islands might be restored to health, and where whole organizations who have served in malarious and unhealthy localities might be stationed for duty. The climate seems to be an ideal one for troops to serve in and keep in good health, but besides the fact that there might be insuperable difficulties in so managing the changing of the troops in the division that all could get sufficient service in this favored district, and at the time they might most need it, it seems to me that invalid soldiers need a more radical change than can be obtained in the archipelago, and that men worn-out by constant and repeated attacks of sickness in the Tropics require a year or two at least in their own country before being again fit for duty here.

The great expense which would be incurred in establishing and maintaining a sanitarium in Benguet, with its inaccessible location, requires caution to be exercised in this matter. The results of troops actually camping in Benguet should first be known, as to their physical condition and the presence or absence of usual tropical diseases.

TRANSPORTATION.

The transportation of over 4,000 invalids, insane, and men to be discharged on surgeon's certificate of disability, to San Francisco has been successfully carried out, and, from what I can unofficially gather, great improvement has taken place in the condition of the large majority. Deaths have occurred from dysentery and other diseases, but on many occasions, after careful deliberation, and on the urgent prayers of the patient, men were sent as a last hope. It is unfortunate that I have not in my possession official statistics concerning the health, recoveries, and mortality of invalids on transports to the United States.

For inter-island transportation of sick to Manila, the hospital ship *Relief* has been the main reliance of the Medical Department. She has been used for the double object of collecting the sick from remote stations for transport to Manila, and more recently for the purpose of giving the benefits of a sea voyage to invalids in Manila who were seemingly not improving in the hospitals. Incidentally, the *Relief* has distributed much-needed supplies to remote stations.

The first consignment of invalids to be given the benefits of a sea voyage on the *Relief* left Manila March 21, and consisted of 140 patients.

Many of these had been on sick report for weeks at the different hospitals. The change of air and food, the interest of the voyage, and the cool nights had a most decided effect for good; 29 were entirely well and 100 much benefited. Major Perley, commanding the *Relief*, was so much struck with the result that he recommended on future voyages of the *Relief* that 150 convalescents should be sent for the benefits of the sea trip.

On April 16, 180 selected patients from Manila hospitals were given this opportunity. The results were equally beneficial, and Major Perley reached the conclusion that cases of dysentery, malarial, and typhoid convalescents do particularly well, but that tuberculosis does not improve and should not be sent.

Short outings in the launch *New York* are given every day for two hours to the sick in Manila hospitals able to stand the little journeys. These are of real benefit to the convalescent sick and give the greatest pleasure, which is evinced by the eagerness of the patients to be allowed to go.

After trying in vain to find in these waters a vessel of light draft, suitable for a hospital ship, and able to enter the shallow harbors and go up the rivers of the archipelago, for the purchase of which authority was received from the War Department, I finally requested that the vessel be bought and fitted out in the United States and sent here.

Three vessels were pronounced by the Medical Department as fitted for this purpose, but all were rejected by the Quartermaster's Department on account of excessive price, or unsuitable machinery requiring expensive alterations. There will always be need of such a vessel, and it is hoped that final action will not be long delayed.

BOARD OF HEALTH OF MANILA.

The board of health of the city of Manila is composed of six active members, all medical officers of the Army, and two honorary members from the medical profession of Manila.

In a report made to the provost-marshal-general, covering the period from July 1, 1900, to April 30, 1901, Maj. Franklin A. Meacham, surgeon, United States Volunteers, president of the board, gives concisely a most interesting history of the operations of his department. The work done was enormous in amount and was performed with a thoroughness and attention to detail deserving the highest praise.

Maj. Guy L. Edie, surgeon, United States Volunteers, was president of the board until December 12, 1900, when he was ordered to the United States and Major Meacham detailed in his place.

The important work of taking a census of the inhabitants of Manila was begun on January 1, and ended in April. It was made under the personal supervision of, and practically by, First Lieut. Harry L. Gilchrist, assistant surgeon, United States Army, chief of the sanitary division, board of health, and is believed to be the first accurate census of the city of Manila.

The total population of the city of Manila, exclusive of officers and men of the Army and Navy, was found to be 244,732, divided as follows:

Americans	8,461
Filipinos	181,361
Chinese	51,567
Spaniards	2,382
Other nationalities	961
Total	244,732

In connection with the census a complete sanitary map of the city was prepared, "on which was checked every house, hut, and outhouse; separate sanitary plans were made also for each premises, with population by age, sex, and nationality."

During the period of ten months covered by Major Meacham's report the total number of births registered in Manila was 3,349, or 18.29 per 1,000. Many births occurred without medical attendance and were not certified to by anyone. This rate is therefore incomplete and unreliable.

The number of deaths, including stillbirths, was 8,671, an annual rate of 42.54 per 1,000, exclusive of Army and Navy. Twelve cemeteries and 1 crematory are in charge of the board of health.

Burial permits are required and certificates of deaths, when not furnished by attending surgeons, are made by municipal physicians after examination of the dead body. A careful check is kept on the permits and cemetery reports. Mistakes are investigated and are very rare.

No disinterment can be made without a permit by the board. An inspector is present at each, and the body must be placed in a hermetically sealed casket.

A system of regular house-to-house inspection is carried on irrespective of special and extra work in epidemics. The city is divided into 10 districts for this purpose, and the available force consists of 1 medical officer (member of board), 1 interpreter, 1 chief inspector, 10 district inspectors, 30 subdistrict inspectors, 60 inspectors.

Ten of these are Chinese and the rest Filipinos. Every house must be inspected at least weekly. Contagious disease is searched for, rat poison is distributed, and disinfection performed when necessary. A sanitary card is posted on each house, on which is noted the condition found by the inspector, with the date of visit. The work of the inspector is thus checked by the chief and district inspectors.

The people evince a most gratifying willingness to accept the sanitary instructions of the board of health, and Major Meacham reports that the sanitary condition of the city is excellent, as far as the inhabitants can make it so, and that the many unhygienic conditions remaining can only be remedied by the municipality and by the expenditure of much money.

Improvements most urgently needed are (1) a system of drainage and sewerage; (2) dredging and cleaning moats and canals; (3) a water supply, pure and ample.

Four hundred and thirteen licenses were acted on, involving physicians, pharmacists and dentists, the sale of food and drink, offensive trades and lodging houses, of which 310 were approved.

The board of health has had to contend with the following infectious or contagious diseases: Bubonic plague, smallpox, tetanus, typhoid fever, tuberculosis, whooping cough, measles, mumps, beri-beri.

Compulsory notification is required of each case of the above diseases except beri-beri and tuberculosis.

Cholera has fortunately not gained an entrance, though present at Singapore and on shipboard at Hongkong.

Bubonic plague is dealt with in the most stringent manner. Two hundred and fifty-four cases with 199 deaths have occurred:

	Cases.	Deaths.
Chinese	166	135
Filipinos	86	62
Spanish	1	1
American	1	0

The following method of dealing with the plague is in use: Medical officers, usually acting assistant surgeons awaiting transportation to the United States and temporarily reporting to the board for duty, are stationed in the infected districts, each having an office with telephonic connection with the board office. Every case of illness and every death in the district is reported to them, and they visit each case and inspect the dead. When necessary, they send the patient or body to the general plague hospital or the Chinese plague hospital, in ambulances used only for this purpose, and summon a disinfecting cart at the same time. An inspector accompanies each patient or corpse to its destination; another takes charge of the house until the disinfecting cart arrives; the floors are wet down with 5 per cent carbolic acid; all clothing and articles which have been in contact with the infected person, and everything not easily disinfected, are burnt in the street; other articles are sent to the steam disinfector. The house is systematically treated with carbolic solution, which is thrown into all crevices by a force pump; all occupants of the house take a disinfectant bath, and exposed persons are sent to the detention pavilions. The house owner is compelled to make such alterations and repairs as may be needed, and the house is placarded and visited daily until twelve days have passed. The disinfecting carts are specially constructed and have a metal-lined compartment for articles to be sterilized, besides room for apparatus, etc. Bodies are removed in metallic caskets, to be burned or buried in quicklime. Inspectors are on duty day and night.

Experience shows the infected districts to be about the same as last year. A system of depopulation is being actually carried on. Infected houses and unsanitary hovels in their neighborhood are attacked and cubicles and partitions are removed; outhouses and structures built in yards and unfit for human habitation are destroyed, letting in sun and air; sewers and drains are flushed by the fire department under supervision of the board; all evicted people are given shelter in tents until they can find dwelling places.

These measures will have to be carried on unremittingly, but the very extensive municipal sanitary improvements already mentioned must be accomplished before Manila can be considered a healthy city.

Every precaution is taken to prevent the spread of plague from Manila to the provinces; all passengers leaving by ferries and inter-island boats are inspected in conjunction with the Marine-Hospital Service, and a medical officer inspects all passengers leaving by train.

Smallpox in Manila has been very mild, with 101 cases and only 2 deaths. Shortly after the American occupation the newly appointed board of health began to institute thorough vaccination, principally among the children. This year the majority of cases are adults; vaccination and revaccination are being effectively carried on; 22,590 children and 43,128 adults have received it during the period.

The Vaccine Institute manufactures reliable virus, and 899,900 units were prepared from 57 young caraboa calves in the form of glycerinated lymph. The amount was distributed throughout the archipelago.

The system of house-to-house inspection has revealed a good many cases of leprosy. There are now 159 lepers under treatment in Manila and 27 died during the period. The report of the board to select a suitable island for the segregation of lepers was made and is now in the hands of the civil commission. Until the plan to form such a settlement for the segregation of all lepers in the archipelago is carried out the treatment of the leper will be unsatisfactory and the extermination of the disease impossible.

Measles, mumps, and whooping cough are not common, and are of a mild nature. Mumps has often been confounded at the outset with plague. First Lieut. W. J. Calvert is in charge of the bacteriological laboratory of the municipality. This has only been recently fully equipped, but has done much and varied work on urine, fæces, sputum, and blood for the practitioners of Manila. Glanders has been detected in horses and trichina in hogs. Most of the work in the laboratory has been on plague, and 160 blood examinations have been made. The plague organism, its effect on animals, and the pathological changes caused in them have been studied and form the foundation of Lieutenant Calvert's pamphlet on plague, the third of the series of circulars on tropical diseases issued. Cultures of plague from Tokyo and Hongkong have been compared with cultures from Manila.

Work on antiplague, antityphoid, and antitetanus serum has been carried on at the farm in the grounds of the San Lazaro Hospital.

Rinderpest, which is prevalent among the cattle of the Philippines and bears directly, of course, on the public health by affecting the meat and milk supply of the people, is being studied here also. An immunizing serum is being tried, and results are promising. A circular on this disease was issued in English and Spanish, with differential diagnosis from foot-and-mouth disease.

Four hundred and twenty-six blood examinations have been made on native prisoners of war in search of filaria, but only two positive cases were found.

Repeated bacteriological examinations of the water supply of Manila, of the Mariquina River and Laguna de Bay have also been made in the laboratory as a preparation for the contemplated work of providing the city with a pure and ample water supply. A series of water examinations and tests of the purity of the ice manufactured in the city are, independently of the board of health, being made by Maj. Charles B. Ewing, surgeon, United States Army, at the Santa Mesa Hospital.

Chemical analysis of the city water has also been made by the city chemist. The examinations so far are not conclusive, but go to show that the Mariquina River above Montalban possesses marked advantages over the Laguna as a future source of Manila water supply.

The board of health has prepared 16 important municipal ordinances bearing on public health, and submitted them to the board appointed to consider city regulations and ordinances.

The forthcoming annual report of the board will be a full and detailed statement of all its operations for the fiscal year, with tables, maps, and pictures. The operations of the Manila board of health indicate in a perfected form the important public sanitary work which is being done throughout the islands by medical officers of the Army. Every city has its health officer and every little inland town where troops are stationed has its sanitary condition, more or less supervised by the medical officer.

HEALTH OF PRISONERS OF WAR.

A large number of prisoners were held in Manila during the last few months, and it was found necessary to engage native physicians to treat them. The general supervision of their health and the sanitary condition of the prisons is intrusted to the chief surgeon of the separate brigade, provost guard.

Beri-beri prevails quite extensively among the prisoners, and those in the early stages of the disease were, on the recommendation of the chief surgeon, released and discharged, when practicable. The patients were isolated in tents, and every attention paid to hygienic conditions. As the ration for native prisoners was not considered suitable for the disease, it was promptly improved, and in the case of the sick the money value was authorized to be expended for articles deemed necessary for their diet, and a marked improvement was then noted.

Accurate statistics are not at hand for the total period, but between March 10 and April 10, 1901, the total number of prisoners of war was 4,149; total sick, 1,336 (of beri-beri, 697); deaths—beri-beri, 45, other causes, 50. Fifty per cent of all sickness is beri-beri. On April 12 the improved ration was introduced and now there is a great reduction in new cases and many recoveries, 23 having been returned to duty in one day.

MEDICAL PERSONNEL.

At the date of my last report, July 31, 1900, there were 375 posts where garrisons were stationed. To-day there are 479, an increase of 104, counting Manila as a garrison, although troops are located at 23 separate stations in the city.

Although the number of garrisoned posts has increased and the work of the department, outside of the direct care of the health and lives of the officers and men, has become more comprehensive and is still reaching out in many directions, the number of medical officers, allowing for inevitable loss by termination of contract and muster out of volunteers, has not increased proportionately. Even should there be a decided reduction in the total strength of the army in the archipelago, so long as many an scattered towns and barrios are occupied by the army, so long will there be a necessity for a number of medical officers, much larger than is generally deemed sufficient for troops concentrated in regiments or battalions.

On May 15, the total strength of medical officers in the division was 491, nonavailable 68, leaving 423 available. The following table gives their assignments:

Available officers.

Chief surgeons and assistants (of division, departments and districts)	20
Hospitals	67
Supply	5
With troops	331
Total	423

Nonavailable.

Board of health	7
Board on tropical diseases	2
Attending surgeon	1
Detached service (United States)	8
Sick	11
On transports	2
Foreign service	7
On leave	4
Under orders to return to United States	26
Total	68

It will be seen that, deducting the necessary officers for administrative supply, large hospitals, etc., there are 331 medical officers to care for the troops at 479 separate stations.

The allowance for Manila and base hospitals, board of health, and administration is kept to the lowest limit consistent with the actual efficiency of the office or institution.

I have already expressed the opinion that the proper ratio of medical officers is six-tenths of 1 per cent of the aggregate strength of the Army, to which should be added for service here one-tenth of 1 per cent for emergency. In my last report I stated that a force of 500 medical officers was necessary to properly care for the number of troops then in the Philippines. The present aggregate strength is less than at that time, but much more scattered, and unless a decided reduction in the number of separate stations takes place in the near future, the prospect is that the department will be again seriously crippled for want of medical officers.

In these islands the Medical Department is charged with a duty far beyond the care of the health of the military forces. It is doing now and must continue to do work connected with public sanitation which is never demanded of it in the United States. In Manila the bubonic plague is being fought night and day, lest it become epidemic, and there is always the possibility of cholera entering Manila from some of the infected ports in Asia. A reserve force of medical officers beyond what is actually needed to care for the troops is required.

A reduction of the military strength without a concentration of troops will not materially relieve the situation. It is the distance between posts and not the numerical strength that should be counted. A soldier at a station of 30 men is just as liable to need medical or surgical aid as at a regimental post, and is just as much entitled to it. If he can not promptly obtain treatment from a neighboring station, a medical officer should be stationed with the detachment at the 30-man post.

Assuming a continuance of the present conditions, I still deem 500 medical officers necessary.

There is no fear that a large excess of officers will, under any conditions, be present in the Philippines, as chief surgeons of departments have orders to report all surplus surgeons for annulment of contracts.

Just now the plague in Manila is at its seasonal height, and with a view of utilizing the services of contract surgeons in Manila awaiting transportation home, I have directed them to report to the president of the board of health for duty as sanitary inspectors.

The army medical examining board has been in session in Manila since April 28, 1900, and has examined 150 candidates for the Medical Corps, United States Army. Of these, 44 have passed successfully and 25 are already commissioned and 19 approved candidates remain. The candidates were entirely from medical officers of volunteers and acting assistant surgeons, United States Army.

The medical officers in this division have, as a rule, been zealous and efficient in performing their duties, responding promptly when called upon for extra services, which they rendered cheerfully and without complaint.

The sanitary work, both in its military and civilian aspect, has been exceptionally good, and the vigilance of medical officers in this respect has been an important factor in securing the comparative freedom of the army from the ravages of tropical and infectious diseases.

The following medical officers were killed in action or died from disease while in the performance of their duty:

Killed in action.—Acting Asst. Surg. F. W. Hulseberg, United States Army, killed August 1, 1900, in engagement at Majayjay, Laguna, Luzon, P. I.; Acting Asst. Surg. C. B. Ross, United States Army, killed February 2, 1901, between Tayum and Bucay, Abra, Luzon, P. I.

Died from disease.—Maj. W. R. Hall, surgeon, United States Army; Maj. J. C. Davis, surgeon, United States Volunteers; First Lieut. L. P. Smith, assistant surgeon, United States Army; First Lieut. S. M. Stuart, assistant surgeon, United States Volunteers; Acting Asst. Surg. J. A. Rabbett, United States Army; Acting Asst. Surg. S. A. Yule, United States Army.

MEDICAL SUPPLIES.

Medical supplies are now sufficient for the needs of the division, and there is little complaint as to quality.

Every care is taken to check expenditure, and district surgeons are instructed to keep a vigilant eye on the use of medicines at their posts when inspecting.

The standard supply table in use in the United States authorizes an allowance of many medicines entirely inadequate to the actual need of troops in the Tropics. Broadly speaking, in remedies used for malarial and intestinal complaints, tonics, restoratives, dressings, and topical applications for skin diseases, ulcers, boils, and slight injuries, the expenditure is relatively very large. Men doing duty are at all times more or less under treatment, if for nothing else than a patch of dhobie itch, or an inflamed abrasion from a new shoe. Whole companies in specially malarious localities are taking quinine prophylactically. Strychnia and iron are used daily by scores of men not on sick report. The dividing of the troops into many small detachments and the necessary supply of simple remedies to small scouting parties cause an unavoidable wastage. Of late there has not been much loss in transit of medical supplies.

A supply table for use in the Philippines, calculated on a six months' basis, and making due allowance for local needs, is in the hands of chief surgeons and seems to be a satisfactory guide for medical officers passing upon requisitions.

It was found necessary, in the interest of economy, to establish supply depots in each department, besides the general depot for the division. Subdepots, under charge of chief surgeons of districts, are also in operation at Vigan, Aparri, Calamba, Nueva Caceres, Cebu, and Cagayan. This plan works satisfactorily and prevents delay and loss, which would inevitably occur with only one central supply depot.

Ice machines are in operation at 17 points, and prove of inestimable value in the treatment of the sick and the comfort and health of the troops. There has been much complaint on account of alleged inferior workmanship in some of these machines, causing constant breakdowns and great trouble and expense in repairs. The output of ice seems also not always to be what is claimed for the machine. Extra strong apparatus is required for use here, as energy is expended in lowering the tepid water supplied to the freezing point.

HOSPITAL CORPS.

The following is the numerical status of the hospital corps of the division:

On duty August 1, 1900	2,356
Gained:	
From United States	798
Transferred from line	4
From desertion	1
Enlisted and reenlisted	23
Appointed hospital stewards from United States Volunteers	8
Total gains	834
Loss:	
Transferred to United States	443
Discharged	108
Died	24
Deserted	9
Transferred to line	1
Total loss	585
On duty April 30, 1901	2,605

Under present circumstances I deem a 5 per cent allowance of Hospital Corps to the aggregate strength of the command to be necessary in the proportion of one hospital steward, or acting hospital steward, to each five privates of the corps.

A diminution of the force in the Philippines, and especially a concentration at central points, will allow a great reduction in this estimate.

Noncommissioned officers and privates have performed duties calling for good judgment, knowledge, and self-reliance, often in the absence of medical officers. Some of them have profited by their experience in tropical diseases to such an extent that confidence can be placed in their ability to recognize the severity of symptoms in a given case, and to give due notice to neighboring surgeons. When several separate posts are under the care of one surgeon this is a valuable acquirement.

It is gratifying to note that officers and enlisted men of the line as a rule appreciate and commend the work of the hospital corps man. Dangers and hardships have been shared by each equally. The members of the Hospital Corps have done their duty faithfully and fearlessly.

The school of instruction for the hospital corps at hospital No. 3 has graduated three classes in sessions of 14 weeks each; total number of scholars 137, of whom 50 received diplomas. The fourth class, now undergoing instruction, consists of 60 men. The interest taken and results accomplished more than justify the establishment of the school.

Instruction of a practical kind has been given detachments of the Hospital Corps at all stations. There are so many small posts with only one or two privates of the corps that litter drill has, as a rule, been impracticable. With very few exceptions the men have seen field service and understand the use of dressings and the handling of wounded. Too much of this kind of instruction can not be given. In my opinion drill with the ambulance and litter, according to any kind of prescribed manual, is time largely wasted. Instruction at centrally located schools, followed by service with troops in the field and garrison, and the grading of privates in two or three classes, according to efficiency and nature of duties, should give us a personnel of the highest attainable efficiency. I have already expressed my views at length on this subject in two letters to the Surgeon-General.

The following members of the Hospital Corps have performed such special services as entitle them to particular mention: Hosp. Steward E. C. Baldwin, for distinguished service in action; Private William H. Phelps, Hospital Corps, for distinguished service in action at Maniclene, P. I.; Private Michael Ilitz, Hospital Corps, for distinguished service in action at Maranduque, P. I.

The army nurse corps, finally put on a permanent basis by recent legislation, had 107 members on duty April 30, 1901, at the larger hospitals, and performed efficient and faithful service. In addition to these, seven male contract nurses are still in service.

REPORT OF MAJ. V. HAVARD, SURGEON, UNITED STATES ARMY, CHIEF SURGEON, DEPARTMENT OF CUBA, JULY 22, 1901.

I have the honor to submit the following report of the operations of this office for the fiscal year ending June 30, 1901:

The health of the troops in Cuba during the year has been very good, showing a marked and steady improvement upon former years. Thus, while during the year ending June 30, 1900, the admissions to the sick report were 322 per cent, with 1.51 per cent of deaths, the admissions during the past year are only 193 per cent, with 1.25 per cent of deaths. Comparing the results obtained in the appended table for the island of Cuba with the statistics in the last report of the Surgeon-General (calendar year 1899), we find that our ratio of admissions is less than that for all troops outside the United States (252), but more than that for troops stationed in the United States (168). In like manner, our ratio of deaths is less than that for all islands (2.55), but more than that for the United States (0.79). Our mortality was largely increased by outbreaks of yellow fever, a disease not likely again to occur among troops in Cuba, except possibly in a scattering, sporadic manner. If we deduct the number of yellow-fever cases from the total mortality we obtain a percentage of 0.80, practically that of the United States.

Further comparison furnishes instructive details. In Cuba the ratio of admissions for diarrheal diseases, dysentery, malarial fevers, and yellow fever, as should be expected, is higher than in the United States, but that of the common infectious diseases, such as scarlet fever, measles, smallpox, influenza, mumps, diphtheria, is very much lower, the majority of cases under the heading of "Other infectious diseases" in our tables being vaccinia; that is, the condition produced by vaccination. There was not a single case of smallpox during the year. The ratio of typhoid fever is about one-third that of the United States, and much greater in western Cuba, where are the large seaport towns, than in the eastern part of the island. Strangely enough, tuberculosis among our troops is more common in Cuba than in the United States, as 0.44 to 0.32, and about the same as in all the islands (0.45), which is remarkable, in view of the fact that other diseases of the respiratory system, such as bronchitis and pneumonia, are almost unknown. This relative frequency of tuberculosis among soldiers in Cuba, and its great prevalence among civilians, would tend to show that a rather high and equable temperature all the year round is not by itself a factor of great importance in the prevention and cure of that disease.

Our record for syphilis and other venereal diseases is bad, being nearly double that of the United States, and apparently also worse than that of all the islands. This evil has always been one of the troublesome problems to confront surgeons in Cuba, and there is no satisfactory solution in sight. About one-eighth on the sick report are victims of it. Were it possible to examine all prostitutes and subject them to treatment when necessary, these diseases would be much less prevalent; but in several garrison towns there is no law requiring examination, or else it is so loosely applied by the municipal authorities that it fails of its purpose. Even when applied with ordinary diligence it does not reach clandestine prostitution nor the many women living in a state of concubinage. It has been proposed to apply the remedy inside instead of outside, and subject all enlisted men to a weekly examination, those found diseased being placed under treatment and debarred from post exchange and pass privileges. There is no question as to the excellent results of this plan wherever put into practice, but the objections against it are so strong that it is never extended beyond a few posts, and the wisdom and practicability of enforcing it as a general rule is very doubtful. The ratio of alcoholism is likewise high, at least double that of the United States. This is, in a large measure, attributable to the cheap and wretched alcoholic beverages sold in all parts of the island, especially since the prohibition to sell intoxicating drink in the post exchanges.

It is also interesting to compare the western half of the island, comprising four provinces, with the eastern half, comprising the provinces of Santiago and Puerto Principe. In the western half the mean strength of the command is 3,344, and the percentage of admissions only 150, which is less than in the United States. In the eastern half, on the contrary, with mean strength 1,772, the percentage of admissions is 274, not only more than the United States, but greater than for all the islands. The difference depends mostly upon the much greater number of cases of diarrheal diseases and malarial fever, so that, after making due allowance for the personal equation of medical officers and the smaller size of posts, it is safe to conclude, leaving yellow fever out of consideration, that the eastern half of the island does not enjoy as good hygienic and climatic conditions as the western half; thus, five deaths from malarial fever occurred in the province of Santiago and none in any of the other provinces. In my report for the fiscal year ending June 30, 1900, it was also shown that malarial fever gradually increased in frequency and severity from the western to the eastern end of the island.

The ratio of deaths per 1,000 is 13.6 for western and 10.1 for eastern Cuba, a difference due to the 24 cases of yellow fever occurring in the western provinces. If we deduct these, the ratio of deaths will be less for the western than for the eastern provinces.

With the acquisition of our recent knowledge of the propagation of malarial fever it may be taken for granted that this preventable disease will be hereafter greatly reduced and at most posts practically eliminated. As an instance, for the week ending June 23, 1900, there were 34 cases of malarial fever under treatment at Rowell Barracks (Cienfuegos). A year afterwards, for the week ending June 22, 1901, chiefly in consequence of sanitary measures promoted by the post surgeon, Lieut. A. E. Truby, there was not a single case.

Yellow fever.—In my report for the fiscal year ending June, 1900, I described three outbreaks of yellow fever outside of Havana involving American troops—at Santiago de Cuba, Santa Clara, and Quemados. That of Santiago ended in October, 1899, and, thanks to the energetic measures carried out by the chief surgeon, Maj. L. C. Carr, not a single case has occurred since then in that city (troops and civilian population), although previously strongly contaminated. The other two outbreaks came to an end in July, 1900. In June, July, and August, 1900, 30 cases occurred at Pinar del Rio Barracks, with 9 deaths. The first few cases were unrecognized by the surgeon and the infection was allowed to spread before proper measures of isolation were taken. Five sporadic cases occurred at Hamilton Barracks between August and November, but none was permitted to become a focus of infection. The last cases recorded among enlisted men are the nine who were experimentally inoculated by infected mosquitoes at Quemados in December, January, and February, without a single death. Since then all our posts have been absolutely free from yellow fever.

In the summer of 1900, on the recommendation of the Surgeon-General, a board of medical officers consisting of Maj. Walter Reed, United States Army, and Contract Surgeons Carroll, Agramonte, and Lazear, United States Army, was convened in Havana for the investigation of tropical diseases. The result of its experiments, as already well known, was one of the most brilliant medical discoveries of the age, namely, the mode of transmission of yellow fever, and, as a natural consequence, a complete revolution in the methods adapted to prevent and combat this disease. The doctrine of the transmission of yellow fever by the bite of mosquitoes having been proved by incontrovertible experiments on nonimmunes and fomites proved to be harmless, the following circular, having received the sanction of the Surgeon-General, was published:

CIRCULAR, }
No. 5. }

HEADQUARTERS DEPARTMENT OF CUBA,
Habana, April 27, 1901.

Upon the recommendation of the chief surgeon of the department, the following instructions are published and will be strictly enforced at all military posts in this department:

The recent experiments made in Habana by the Medical Department of the Army having proved that yellow fever, like malarial fever, is conveyed chiefly, and probably exclusively, by the bite of infected mosquitoes, important changes in the measures used for the prevention and treatment of this disease have become necessary.

1. In order to prevent the breeding of mosquitoes and protect officers and men against their bites, the provisions of General Orders, No. 6, Department of Cuba, December 21, 1900, shall be carefully carried out, especially during the summer and fall.

2. So far as yellow fever is concerned, infection of a room or building simply means that it contains infected mosquitoes; that is, mosquitoes which have fed on yellow fever patients. Disinfection, therefore, means the employment of measures aimed at the destruction of these mosquitoes. The most effective of these measures is fumigation, either with sulphur, formaldehyde, or insect powder. The fumes of sulphur are the quickest and most effective insecticide, but are otherwise objectionable. Formaldehyde gas is quite effective if the infected rooms are kept closed and sealed for two or three hours. The smoke of insect powder has also been proved very useful; it readily stupifies mosquitoes, which drop to the floor and can then be easily destroyed.

The washing of walls, floors, ceilings, and furniture with disinfectants is unnecessary.

3. As it has been demonstrated that yellow fever can not be conveyed by fomites, such as bedding, clothing, effects, and baggage, they need not be subjected to any special disinfection. Care should be taken, however, not to remove them from the infected rooms until after formaldehyde fumigation, so that they may not harbor infected mosquitoes.

Medical officers taking care of yellow fever patients need not be isolated; they can attend to other patients and associate with non-immunes with perfect safety to the garrison. Nurses and attendants taking care of yellow fever patients shall remain isolated, so as to avoid any possible danger of their conveying mosquitoes from patient to non-immunes.

4. The infection of mosquitoes is most likely to occur during the first two or three days of the disease. Ambulant cases—that is, patients not ill enough to take to their beds and remaining unsuspected and unprotected—are probably those most responsible for the spread of the disease. It is therefore essential that all fever cases should be at once isolated and so protected that no mosquitoes can possibly get access to them until the nature of the fever is positively determined.

Each post shall have a "reception ward" for the admission of all fever cases, and an "isolation ward" for the treatment of cases which prove to be yellow fever. Each ward shall be made mosquito-proof by wire netting over doors and windows, a ceiling of wire netting at a height of 7 feet above the floor, and mosquito bars over the beds. There should be no place in it where mosquitoes can seek refuge, not readily accessible to the nurse. Both wards can be in the same building, provided they are separated by a mosquito-tight partition.

5. All persons coming from an infected locality to a post shall be kept under careful observation until the completion of five days from the time of possible infection, either in a special detention camp or in their own quarters; in either case their temperature should be taken twice a day during this period of observation so that those who develop yellow fever may be placed under treatment at the very inception of the disease.

6. Malarial fever, like yellow fever, is communicated by mosquito bites and therefore is just as much of an infectious disease and requires the same measures of protection against mosquitoes. On the assumption that mosquitoes remain in the vicinity of their breeding places, or never travel far, the prevalence of malarial fever at a post would indicate want of proper care and diligence on the part of the surgeon and commanding officer in complying with General Orders, No. 6, Department of Cuba, 1900.

7. Surgeons are again reminded of the absolute necessity in all fever cases to keep from the very beginning a complete chart of pulse and temperature, since such a chart is their best guide to a correct diagnosis and the proper treatment.

By command of Major-General Wood:

H. L. Scott, *Adjutant-General.*

Hygiene of posts.—All enlisted men are in comfortable, permanent barracks, with one exception. The cavalry troop at Camp McKenzie, Puerto Principe, are still under canvas, but with the benefit of every improvement that a camp admits of. Five of our largest posts have been built on new selected sites since the American intervention, and combine as many favorable hygienic conditions as possible: the others occupy old Spanish quarters more or less extended and renovated and answering their purpose very well. The disposal of garbage and refuse is simple and effective; most of our posts, being near the shore, dump everything into the sea; none has a crematory. All the posts built on new sites (Columbia Barracks, Hamilton Barracks, Rowell Barracks, Cabana Barracks, Morro Castle (Santiago) Barracks) are provided with modern sewerage with outlet into the sea. At other posts the milk of lime and excavator system is successfully employed, while a few still use the old-fashioned latrines.

The clothing is, in the main, well adapted to the climate, with the exception of the campaign hat; this should have an all-round space outside the sweat band for ventilation and, if possible, be made of rain-proof material. Since the helmet is impossible in the field, it seems necessary to perfect the campaign hat until entirely satisfactory. The criticism commonly heard against the field uniform, and in which I concur, is its homely simplicity, its lack of military neatness and smartness; for instance, the combination of khaki trousers and blue shirt is not effective from a military point of view, and the efficiency of many men is impaired by their inability to use suspenders. I believe the soldier should always wear an outside garment, let it be ever so thin, whether or not he wears an undershirt; this arrangement has also sanitary advantages well pointed out by Capt. M. F. Steele.

The food is generally satisfactory, and it would be difficult to provide for it better than by existing regulations. Very few complaints have appeared in sanitary reports. It is true, nevertheless, that in Cuba good palatable fruits are neither common nor cheap; that specially those to which North Americans are accustomed and most fond of are very rare and sadly missed, and that vegetables are seldom plentiful. These deficiencies, however, concern the luxuries rather than the necessaries of the soldier's life. The vexed question of the quantity of meat which should be consumed by the soldier in this climate to maintain his most effective health seems to have been practically solved by common experience. It may be doubtful whether North Americans eat as much in Cuba as in the United States, but the proportion of meat to the whole quantity of food consumed is fully as great here as in the colder regions. At Columbia Barracks, our largest and most important post, with a garrison 1,300 strong, fish (canned salmon) is only drawn once a month in lieu of meat; at the other posts in the immediate vicinity of Habana no fish is drawn at all. It is further found that at Columbia Barracks at least 93 per cent (89 as beef, 2½ as pork, and 1½ as chicken) of the meat allowance is consumed, the remaining 7 per cent being traded off for eggs, butterine, and post-exchange articles. With this diet, the number of admissions for diarrhea at that post during the past year was 9.42 per cent, as against 9.45 per cent for troops stationed in the United States.

Particular care has been given to the building, repair, and equipment of post hospitals so as to give sick soldiers all the advantages of modern treatment with the best hygienic surroundings. These hospitals are more or less on the pavilion system, consisting of frame buildings with very free ventilation, double roofs, and wide porches, the wards rather large so as to secure unrestricted air movement. None of the old Spanish stone hospitals are now in use for soldiers, except at Holguin. It has been demonstrated that all classes of surgical operations can be performed in Cuba with at least the same chance of success as in the United States. There is no longer any general hospital in the department, this having been found unnecessary after conditions had settled to those of normal and peaceful times. Every post takes care of its own sick and wounded, with the exception that in cases of major operations surgeons who do not possess the necessary qualifications send their patients to Columbia Barracks or to Morro Castle (Santiago) for treatment at the hands of skilled operators. At Columbia Barracks, Maj. A. N. Stark, and at Morro Castle, Maj. L. C. Carr and Lieut. I. A. Shimer, have done very successful surgical work, for which they are entitled to much credit.

Movements of the troops and medical officers.—On July 1, 1900, the then Division of Cuba consisted of three departments: Department of Habana and Pinar del Rio, Maj. J. R. Kean, surgeon, United States Army, chief surgeon; Department of Matanzas and Santa Clara, Maj. F. J. Ives, surgeon, United States Army, chief surgeon; Department of Santiago and Puerto Principe, Maj. L. C. Carr, surgeon, United States Volunteers, chief surgeon. By General Orders, No. 98, A. G. O., July 23, 1900, these three departments were reduced to two, namely, Department of Western Cuba (including the four western provinces), under Gen. Fitzhugh Lee, Maj. J. R. Kean, chief surgeon, and Department of Eastern Cuba (including the two eastern provinces), under Gen. Samuel M. Whitside, United States Volunteers; Maj. L. C. Carr, chief surgeon, succeeded during leave of absence by First Lieut. Ira A. Shimer, assistant surgeon, United States Army.

On November 15, 1900, the Departments of Eastern and Western Cuba were discontinued, and the division reduced to the Department of Cuba. However, on account of the remoteness of certain posts in the eastern part of the island the province of Santiago was organized into a district under Gen. Samuel M. Whitside, United States Volunteers, with complete district staff; First Lieutenant Shimer, chief surgeon, succeeded on his return from leave by Maj. L. C. Carr. This consolidation and the departure of the two regiments of infantry was followed by the abandonment of 11 garrisoned posts, the surplus medical officers and hospital corps men accompanying the troops to the United States or being otherwise disposed of.

There are now in the department 14 garrisoned posts, each with one or more medical officers, and one subpost (Baracoa) in charge of an acting hospital steward (graduate of medical college). There are, besides, one supply depot at Habana and one infectious-disease hospital at Santiago de Cuba, the latter to be turned over to the municipal authorities as soon as possible.

The medical officers on duty in the department on June 30, are as follows:

United States Army:	
Surgeons, with rank of major	4
Assistant surgeons, with rank of captain	1
Assistant surgeons, with rank of lieutenant	5
United States Volunteer Army:	
Surgeons, with rank of major	2
Assistant surgeons, with rank of captain	8
Contract surgeons	13
Dental surgeons	1
Total	34

Of the above medical officers, Maj. W. C. Gorgas is on special duty as chief sanitary officer of Habana, Maj. J. R. Kean as superintendent of the department of charities, and Lieut. I. A. Shimer as sanitary inspector of the city of Santiago. With these exceptions all are on military duty.

In addition to their proper military duties, most medical officers are also necessarily more or less concerned in the sanitation of towns, especially garrison towns. Thus, to prevent the infection of troops, on April 17, 1901, the following circular was published:

HEADQUARTERS DEPARTMENT OF CUBA,
Habana, Cuba, April 17, 1901.

SIR: The department commander directs that the surgeon stationed at your post shall act as medical inspector of the town of ——. He shall advise the commanding officer on all matters in said town which are liable to involve the health of the troops. His chief duties as medical inspector shall be:

1. To keep himself informed of the sanitary condition of the town and to make such special investigations and recommendations as he may deem necessary.
2. To inspect all hospitals in which fever cases are admitted, in order to ascertain the nature and number of these cases, and whether the provisions of circular letter of March 5, issued by the superintendent of charities, by order of the military governor, are being complied with.
3. To investigate the prevalence of mosquitoes, their species, and the extent to which they produce malarial and yellow fever infection, the measures adopted to prevent their propagation, and the success thereof.
4. To ascertain what regulations (if any) are enforced regarding the examination of prostitutes, and their isolation and treatment when diseased.

On the last day of each month (or oftener if necessary), he will report to the chief surgeon of the department, through the post commander, the cases of infectious diseases which ocurred during the month in the town, the general result of his inspections and investigations, and all other sanitary matters whereby the health of the troops may be affected.

A copy of this communication has been furnished the mayor of —— with a letter which it is hoped will secure his full cooperation in the matter.

Very respectfully,

H. L. SCOTT,
Adjutant-General.

The COMMANDING OFFICER.

Hospital corps.—The hospital corps consists of:

Hospital stewards	11
Acting hospital stewards	17
Privates	144

The number of non-commissioned officers is somewhat short of requirements, while that of the privates is slightly in excess of the official allowance; a few of the latter are now being examined for detail as acting stewards. So far as practicable, a hospital school has been organized and maintained at Columbia Barracks, where all corps men ignorant of their duties are sent for training and instruction.

There are also, at present, 8 female nurses on duty in the department, namely, 4 at Columbia Barracks, 2 at Cabana Barracks, and 2 at Hamilton Barracks. These nurses are all women of character, who perform their duties diligently and efficiently. Despite the wisest regulations, female nurses will be now and then, perhaps without any fault of theirs, a troublesome and demoralizing factor at posts, and I believe it will be in the interest of the service to employ them only at large, important hospitals, and never less than two, or still better, three or four together.

Habana.—The work of sanitation in the city of Habana has been prosecuted with undiminished vigor under the able direction of Maj. W. C. Gorgas, United States Army, and with the same gratifying results, as shown by the appended table. The death rate (24.26) has changed but little during the past six months, indicating slight but continuous improvement. Those diseases propagated by mosquitoes, namely, malarial fever and yellow fever, have been very much reduced, while those resulting from defective drainage, absence of sewers, and bad general sanitation, show no reduction, the number of cases of enteritis, on the contrary, having much increased. It is to be lamented that the great work of sewerage and paving, without which the complete sanitary regeneration of Habana is impossible, has not yet been begun; but there is good reason to believe that this much-needed and inevitable improvement will not be postponed much longer. The diseases which, in Habana would be more especially benefited by sewerage are tuberculosis, enteritis and typhoid fever. The mortality of tuberculosis fell from 1,307 in 1899, to 851 in 1900; during the same period, that of enteritis fell from 1,163 to 560, and that of typhoid fever from 240 to 90; but from present indications it would seem that, under existing conditions, the climax of practicable improvement has about been reached, and that the above figures will not be much further reduced until the city is well sewered and the vicious crowding in tenement houses has been remedied. The discovery that mosquitoes breed abundantly in cesspools has also convinced us that there can be little hope of stamping out yellow fever and malarial fever until these cesspools have been replaced by modern sewerage.

The well planned and relentless war carried on against mosquitoes has been productive of remarkable results. Thus, during the first six months of 1900, the mortality from malarial fever was 247; during the last six months, 97, and during the first six months of 1901, only 75. The record of yellow fever is equally interesting. During the first six months of 1900 there were 24 deaths; on account of the unprecedentedly large immigration and consequent increase of nonimmunes the mortality rose to 286 during the last six months, a mortality, however, whose ratio to the number of non-immunes is much lower than ever before in the history of Cuba. It was only during the last winter that the machinery of the sanitary department became fully adjusted to its new purpose—the destruction of mosquitoes and protection of patients from their bites; the sequence, if we may not surely say the consequence, is as follows: January, 9 deaths; February, 6 deaths; March, 2 deaths; April, May, and June, none. It is not reasonable to suppose that all infected mosquitoes have been destroyed, and that no more yellow fever is to be expected in Habana; this deduction is especially unwarrantable in view of the fact already noted, that so many of these insects breed in cesspools out of reach; but it seems logical to infer that a large proportion of infected mosquitoes have been killed or rendered harmless, that hereafter cases of yellow fever will be much fewer than last year, in spite of the fact that non-immune immigrants are greatly increasing every month, and that, after the construction of sewers, the complete stamping out of the infection will be quickly and easily accomplished.

Obligatory vaccination.—Smallpox being a constant and increasing danger in Cuba, a commission was appointed, of which the chief surgeon was president, to study the subject and propose a remedy. Upon its recommendation, Civil Orders No. 165, of June 24, 1901, was issued, making vaccination and revaccination obligatory in Cuba, and establishing a central vaccine institute in Habana, with complete modern equipment for the production of the virus needed for the whole island.

Immigration station.—After the close of the Spanish-American war, immigration, which had stopped since 1895, was actively resumed and on a larger scale than ever. During the year of 1899, 16,260 immigrants arrived in Habana; in 1900, 24,124, and during the first six months of 1901, 7,450. As these immigrants furnish the great majority of non-immunes from which yellow fever is fed, it was deemed necessary to take especial precautions to prevent their infection. All non-immune immigrants on their arrival are taken to a detention station, on the healthiest site around the bay, where they await in comfort and safety offers of employment. Earnest efforts are made to send as many as possible to the rural districts. "In this way all are benefited; the immigrant who procures work without hardship or danger, the city of Habana, which is ridden of dangerous non-immune agglomerations, and employers, who are enabled to get all the hands they require with the least trouble and expense."

REPORT OF MAJ. WILLIAM B. BANISTER, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON, CHINA RELIEF EXPEDITION.

PEKIN, CHINA, *October 15, 1900.*

I have the honor to make the following report of the expedition to China in the capacity of surgeon, Ninth United States Infantry, and as chief surgeon China relief expedition, as far as concerns the operations of the Medical Department. This report covers the period from June 22, 1900, the date I reported for duty with the Ninth Infantry, to September 25, 1900, when I was relieved from duty as chief surgeon of the expedition by Maj. Francis J. Ives, surgeon, United States Volunteers, per paragraph 1, General Orders No. 19, headquarters China relief expedition, dated Pekin, China, September 25, 1900. By virtue of paragraph 11, Special Orders No. 70, headquarters Department of Southern Luzon, dated Manila, P. I., June 20, 1900, I was relieved from duty as chief surgeon first district, Department of Southern Luzon, and ordered to accompany the Ninth Infantry to China. I was relieved by Maj. W. P. Kendall, brigade surgeon, United States Volunteers, on June 21, and on June 22 reported for duty with the regiment. Only a part of the regiment had arrived in Manila, and was quartered part in the Malate Barracks and part in the Exposition Barracks. First Lieut. Charles E. Marrow, assistant surgeon, United States Army, Contract Surgs. William W. Calhoun and Fred M. Barney were ordered for duty on the expedition. Contract Surg. William W. Calhoun reported on June 25, and the others not until the morning of the 26th, the day of embarkation. This left the entire work of equipping and organizing the medical department to me without assistance, and also the care of the sick of the regiment, which had in great part arrived. One hospital steward, 3 acting hospital stewards, and 16 privates were detailed to accompany the expedition. The hospital steward and 12 privates reported on the afternoon of June 25. Arrangements were made for the companies quartered at the Exposition Barracks to receive medical attention from hospital No. 2, which was close by, and a contract surgeon was detailed from headquarters, Division of Philippines, to hold sick call at Malate Barracks. The requisitions for medical supplies were filled and packed in the medical supply depot in Manila and turned over to the Quartermaster's Department for transportation to the *Logan.* The regiment embarked on June 26, but Capts. Thomas S. McCaleb and George Palmer were sent to hospitals in Manila, as they were incapacitated for field service, also several enlisted men. In a letter from headquarters Ninth Infantry I was directed on June 24 to send the necessary medical supplies, 1 surgeon, 1 steward, and a suitable number of hospital-corps men on the transport *Port Albert*, which transported the stock, which was under charge of 100 men. Acting Assistant Surgeon Barney, 1 acting hospital steward, and 4 privates were detailed for this duty. It soon developed that a great many men in the regiment were suffering from malarial cachexia and dysentery and had avoided going on sick report before leaving, from the fear that they would be left behind. Sixty-one of these men were left on the *Logan* for hospital treatment.

The regiment arrived off Taku, China, on July 6. The First and Second battalions left the *Logan* on separate lighters on July 9, Assistant Surgeon Marrow with 1 acting hospital steward and 4 privates with the First Battalion and I with 1 acting hospital steward and 4 privates with the Second Battalion. Contract Surgeon Calhoun remained on board the *Logan* with the Third Battalion, and an acting hospital steward and 4 privates were left with him. This battalion did not arrive in time to participate in the battle of Tientsin. The First Battalion arrived at the foreign concession of Tientsin on July 10 and the Second Battalion on July 11 about 10 p. m. During the 12th I was occupied in separating the medical supplies from the vast amount of material contained in the lighters and arranging an operating room in the marine hospital, which was under the charge of Passed Assistant Surgeon Oliver D. Norton, who arranged with me for the joint use of this building for the wounded of both the marines and soldiers, and, in fact, it was the only building at the time available. I was in general charge, being the ranking officer, as chief surgeon of the United States forces in China, and during the entire period of our association the army and navy medical departments worked together in perfect accord and with mutual assistance. Our troops were formed for attack at 3 a.m. July 13, and at 3.30 a. m. moved out on the road to the Walled City in conjunction with English and Japanese troops. As our columns came under the fire of the enemy—

rather a long-range fire—we were deployed and advanced on the mud wall in open order. Columns of troops could be seen skirting this wall and, protected by it, advancing toward the main gate. As we advanced 1 man was killed and 7 wounded in the First Battalion. This delayed Assistant Surgeon Marrow, on duty with that battalion, so that after we charged across the bridge in front of the main gate and then to the left over the mud wall I was the only medical officer on duty with the two battalions, though I was not aware of the fact until later in the day. After going over the mud wall we could see another wall, apparently of brick, about 1 mile or a mile and a half off, and this was the wall proper for the Chinese City of Tientsin. Our attack began about 5 a. m. After advancing on to the plain between the two walls the fire of all arms from the enemy was most severe and many of our men were hit. Thirty-two men had been detailed as litter bearers from the regiment, but as soon as the fire became hot they threw the litters down to fight to better advantage. This will always be the case with such details, and the only advantage it presents is that it furnishes transportation for the litters to the field. At the time of the battle none of our transportation which was on the *Port Albert* had arrived. Two privates of the hospital corps remained with me throughout the advance under a most severe frontal and flank fire, assisting me in dragging and carrying the wounded to the shelter of the irrigation ditches which seamed the plain and in which the troops took shelter. These men, Privates Thomas Hamilton and Julius C. Heinze, were recommended by me for a certificate of merit. They also assisted me in having Capt. E. V. Bookmiller removed from the field. After our advance had stopped and the troops were sheltering themselves in the ditches, I concluded to take Captain Bookmiller off the field, as he was so wounded that he had to be held up in the water in the ditch, and the men who were holding him up were becoming exhausted. I was also desirous of making arrangements for the prompt removal of the wounded from the field to the hospital and for their refreshment at the collecting station. I therefore returned with the captain to the main gate of the mud wall and established a station behind the wall, just outside the gate. First Lieut. Charles E. Marrow, assistant surgeon, took my place on the firing line and remained there until the withdrawal of the troops, about 8 p. m., and who, on their withdrawal, brought the wounded with them. In the meantime I had sent for and received a number of "gold medal" cots, malted milk, beef extract, and several cases of mineral water for the thirsty, as the water obtainable was practically poisonous. By 12 o'clock midnight every wounded man was in hospital and on a bed in Tientsin. The "gold medal" cot makes a good litter, and when the patient arrives at the hospital has his bed with him, but it requires six men to carry it, as the hinges in the middle will give way unless supported on both sides.

In this battle 18 men, including Col. Emerson H. Liscum, were killed and 78 wounded out of about 420 engaged. The details above mentioned left First Lieut. Charles E. Marrow and myself as surgeons, available for duty during the battle, and 2 acting hospital stewards and 6 privates, as 2 had been detached for duty with two companies on detached service the afternoon of the 12th. Assisted by Assistant Surgeon Marrow, we examined the wounded as they arrived at the collecting station and gave them such refreshment as seemed necessary previous to sending them into the hospital, where Dr. Oliver D. Norton, of the Navy, had gone to receive them. I also sent Contract Surg. W. W. Calhoun into the hospital to assist Dr. Norton, he having reached the battlefield in the afternoon with the Third Battalion, which came up too late to participate. Assistant Surgeon Marrow and myself remained on the battlefield with our battalions, as it was thought that either our forces would renew the attack at daylight or that we might be attacked by the enemy. Early the morning of the 14th one battalion of the Ninth Infantry entered the Walled City, it having been found that the enemy had evacuated during the night.

Finding that the Marine Hospital was too crowded with wounded, I took possession of the Tientsin Hotel and moved all the wounded officers over to that building, including the wounded officers of the Marine Corps. The regiment was quartered about 1 mile from the nearest of the two hospitals occupied, and as quite a large number of sick were present with the regiment, this necessitated the establishment of a dispensary there. Thus the necessities of the situation required the personnel of the medical department to be divided into 3 portions, and, even with the small number of hospital orderlies with the marines, was inadequate to render proper service to 95 wounded (27 marines wounded), beside attending the sick. This difficulty was overcome by asking for details from the regiment, which worked in the wards under charge of Hospital Corps men. Ice in abundance and boiled water was obtained by me for both hospitals. Our transportation did not arrive until several days after the battle, but I believe there are few instances where wounded have had to undergo less hardships than on this occasion.

On July 19, the wounded officers of the Ninth Infantry were sent to the *Solace* off Taku, with proper medical attendance and supplies, viz: Maj. James Regan, Capt. Chas. R. Noyes, adjutant, Capt. Edwin V. Bookmiller, First Lieut. Louis B. Lawton, and First Lieut. Frank Schoeffel, who was suffering from dysentery. Six enlisted men were sent to the *Solace* on July 21 and 48 on July 24, these patients being sent to the *Solace* under direction of the commanding officer of the American forces in China. All the sick requiring hospital treatment were moved to the Tientsin Hotel and the joint occupation of the marine hospital ceased, but some marine officers still remained in the Tientsin Hotel. One of these was Lieutenant Leonard, who was not in condition to be moved. On July 21 I found it necessary to operate on Lieutenant Leonard, and the left arm was amputated by me at the shoulder joint, by Esmarch's operation. Some wounds became infected from the fact that it was necessary to shelter the wounded in irrigating ditches on the battlefield, and the filthy water soaked some of the dressings. The Mannlicher makes a wound similar in character and effect to the Mauser, and some rather remarkable instances occurred of men shot through the thoracic, abdominal, and pelvic cavities without resulting suppuration or apparently serious effects. A number of our men were hit by shrapnel and these wounds, even flesh wounds, were of a serious nature, lacerating and bruising the soft tissues and comminuting bones, and most of them became infected.

This regiment having served about eighteen months in the Philippines, was very much run down and in extremely bad condition for field service, many of the men suffering from various forms of malarial poisoning and chronic dysentery. Three days before landing every man was given 1 gram of quinine each day, and with a marked decrease in the number of cases of intermittent fever, and comparatively few cases have since developed. I think this measure as a prophylactic one is of decided value, and in this case was tried on about 1,200 men. On July 26, 215 men of the Ninth Infantry were present sick. This did not include 61 patients left on the *Logan* or the wounded. The number steadily increased, and it was readily seen that a base hospital should be established at that point of at least three or four hundred bed capacity, with the necessary complement of nurses and surgeons independent of the regimental organization. After the arrival of the cargo of the *Port Albert*, about July 16, the work of conducting the hospital was much easier, as we were then provided with the use of 1 escort wagon and 4 ambulances, and also had an accession of 1 surgeon, namely, Contract Surg. Fred M. Barney. On July 27 the Fourteenth Infantry began to arrive, and brought with them medical supplies for 5,000 men for three months. With this regiment were five surgeons, namely, Capt. and Asst. Surg. W. F. Lewis, First Lieut. and Asst. Surg. E. R. Schreiner, Contract Surgs. Robert N. Winn, H. N. Van Kirk, and C. F. Dickenson.

Immediately after the battle of Tientsin, when it was necessary to keep the operating table in use day and night, and with a hundred or more wounded in hospital, including the marines, Surgeons Norton, Step, and Gunnel, of the Navy, rendered most valuable assistance. The sick report continued steadily to increase, and on August 1 there were 46 sick in hospital and 192 in quarters, and nearly all suffering from diarrhea or dysentery. On July 30 Maj. Gen. Adna R. Chaffee, United States Volunteers, took command of all the American forces at Tientsin, and under the provisions of General Orders, No. 3, Headquarters China Relief Expedition, dated Tientsin, China, July 30, 1900, I became chief surgeon of the China Relief Expedition. I had recommended that Tientsin be selected as the location for the base hospital, contrary to the course pursued by the allies, for the reason that our supplies were there; that it would be a halfway place when the army advanced on Pekin; that after the wounded had recuperated at the base hospital they could be carried on junks direct to the hospital ship *Relief*, which had been cabled for at my request prior to the battle of Tientsin, and was expected soon, thus making it unnecessary and undesirable to establish a hospital at Taku. Paragraph 2, Special Orders, No. 4, Headquarters China Relief Expedition, dated Tientsin, China, August 1, 1900, directed the establishment of a 300-bed hospital. The Tientsin Hotel hospital was in operation with a capacity of 100. In anticipation of this order the Isabella Fisher hospital had been selected for use as a base hospital, and though its capacity was much below the number of beds required, it had yard room for enough hospital tents to make up the number of beds required, and also a very comfortable dwelling house, with room for an office, wards for officers, and quarters for the surgeons on duty. There was also in connection with the hospital a building suitable in every respect for a number of contract female nurses, who were on a transport in the bay off Taku, and who had volunteered for duty in China while en route to Manila. Upon my recommendation, First Lieut. and Asst. Surg. E. R. Schreiner was put in charge of the hospital, with 2 contract surgeons from the *Grant*, 11 female nurses, 4 acting hospital stewards, and 32 privates of the hospital corps as its personnel. At the Tientsin Hotel hospital, at the time the expedition left, Contract Surg. Fred M. Barney was in charge, and 1 acting hospital steward and 8 privates, 4 each from the detachments of hospital corps of the Ninth Infantry and Fourteenth Infantry, on duty therein. The number of female nurses was subsequently increased to 16, and 1 professional male nurse, and the number of surgeons materially increased from time to time, as shown by the appended list.

The expedition left Tientsin on the afternoon of August 4. One hundred and seventy-three men of the Ninth Infantry and 27 of the Fourteenth Infantry were left back in Tientsin sick. The American force consisted of the Ninth Infantry, 2 battalions Fourteenth Infantry, Battery F, Fifth Artillery; detachments of the engineer, signal, and hospital corps, and about 500 marines, aggregating in all about 2,500 men. The medical department was distributed and organized as follows:

Chief surgeon, Maj. W. B. Banister, surgeon, United States Volunteers; 1 hospital steward as clerk, and 1 private, hospital corps, as mounted orderly.

Ninth Infantry: First Lieut. Charles E. Marrow, assistant surgeon, United States Army, surgeon; Contract Surg. William W. Calhoun, United States Army; 2 acting hospital stewards and 11 privates, hospital corps; 2 ambulances; 8 chino litter bearers to each company (under guard to prevent their running away).

Fourteenth Infantry: Capt. W. F. Lewis, assistant surgeon, United States Army, surgeon; Contract Surg. Robert N. Winn, United States Army; Contract Surg. H. N. Van Kirk, United States Army; 2 acting hospital stewards and 12 privates, hospital corps; 1 ambulance; 8 chino litter bearers to each company.

Light Battery F, Fifth Atillery: First Lieut. Henry S. Greenleaf, assistant surgeon, United States Army, surgeon; 1 acting hospital steward and 4 privates, hospital corps; 1 push cart.

Marines: P. A. Surg. George A. Lung, United States Navy; P. A. Surg. George D. Costigan, United States Navy; Asst. Surg. Joseph C. Thompson, United States Navy; 2 naval hospital apprentices; 1 cart; 8 chino litter bearers to each company.

One four-mule escort wagon was assigned to the medical department. Two junks and one for the marines were loaded with reserve medical supplies and stores and were to follow by river. The medical, surgical, and detachment chests were carried in the ambulances, and arranged on each side so that they could be used as seats, or with blankets folded over them for patients unable to sit up. This was absolutely necessary, as it was imperative to have these supplies with the regiments and to follow them into action, as I knew from experience that supplies on a wagon with the train would frequently be unavailable at critical periods, though generally available at night as a reserve supply. It was utterly impracticable, with only one escort wagon, to carry an equipment for a field hospital, nor did we have the personnel to have an independent staff and nurses for a field hospital.

The first battle the Americans figured in after leaving our base was that of Yangtsun on August 6, and in this fight our casualties numbered 65. At the beginning of the fight the ambulances were stationed in the rear of the line, just out of reach of the shell fire, and as this range receded on the advance of our line, the ambulances followed up, picking up the wounded after they had received attention, and following the line of battle till filled with wounded, then going as far forward as safety permitted and unloading. They were then employed in collecting all the wounded at this dressing station, and when our troops camped were all moved to this camp by ambulances and wagons, as it was necessary that they should have protection and water, which could only be obtained in the village where the troops camped. The hospital tent and walled tent were obtained from the wagon and pitched for operation shelters, and refreshment was prepared in the way of hot beef tea, etc. The most seriously wounded were dressed first, and 11 of them gotten off that night on a junk to the base hospital at Tientsin, and all the wounded, with quite a number of sick, on the next day, thus disembarrassing the command of the wounded and sick. This was a necessity, as we could not leave the field hospital for their shelter for reasons above stated, nor could we carry them with us.

The next three days the heat was fearful; sometimes 150 men being prostrated and many having convulsions. Some having convulsions and rendered unconscious would in the cool of the evening be able to walk into camp. The ambulances would be filled to their utmost capacity, and on reaching camp would return and haul until all those unable to walk were in camp. The wagon train would also pick up quite a number. Camps were established on the march at Hoshuon, Matao, and Tung Chow, and it was necessary to leave a number of sick at the camps. Contract Surgeon Van Kirk was left at Matao with sick, and subsequently all these stations were provided with surgeons. During a battle the regimental surgeons remained on the line to render first aid, except one in charge of the ambulance station. After the battle they and the men of the hospital corps were assembled at camp dressing station to attend to the wounded—a system that was uniform throughout the campaign and worked very satisfactorily, but with larger armies and greater casualties would break down, and should not be depended on in lieu of a properly equipped field hospital with staff and personnel independent of the regimental equipment except where necessity dictates.

In the attack on the wall of Pekin, August 14, there were but 11 casualties, and in the attack on the grounds of the Forbidden City, August 15, 23 casualties. The wounded were moved on August 16 to the field hospital established in a building, in the grounds of the Temple of Earth, and on August 21 were sent in ambulances to Tung Chow, the head of navigation on the Pei-ho and by junk from there to the base hospital at Tientsin. The field hospital at Pekin has a capacity of 150 beds and the maximum number present at one time up to date is 141.

The great majority of men admitted to sick report during the campaign were suffering from intestinal disorders, which is the great scourge of American troops. The greatest need in our equipment at present is a medical cart that can follow each regiment as a traveling dispensary and accompany the regiment when detached. These carts form part of the equipment of the medical department, but I have never seen them provided or in use in the field. The value of the first-aid package has already been demonstrated. The orderly pouch proved defective when used by a mounted orderly as the thread holding the strap to the pouch usually broke, rendering the pouch practically useless. The strap should be riveted to the pouch. The new detached service chest proved invaluable, and I consider it the most complete and valuable article in our equipment. The new aseptic hypodermic syringes, all metal, proved very unsatisfactory, and on forcing out the contents the point would become separated from the barrel. There was a great deal of complaint about the syringes.

First Lieut. E. R. Shreiner, assistant surgeon, United States Army, was relieved of the command of the general hospital at Tientsin on August 20, by Maj. William Stephenson, surgeon, United States Army. The latter was also medical disbursing officer and purveyor. Maj. William H. Arthur, surgeon, United States Army, was appointed chief surgeon, Second Brigade, China relief expedition, Tientsin, on September 14, 1900.

The field hospital at Pekin was under command of Capt. W. F. Lewis, assistant surgeon, United States Army, to whom I am indebted for most valuable assistance throughout the advance on Pekin. The work of the hospital corps detachment was satisfactory, and that of Acting Hosp. Steward Arnold D. Tuttle was specially efficient, and he deserves and has earned promotion to the grade of hospital steward. On September 26, I reported for duty as chief surgeon, First Brigade, China relief expedition, and my connection with the duties of chief surgeon of the China relief expedition ceased.

Summary of casualties which occurred in the United States Army expeditionary force in China, from July 12, 1900, to September 25, 1900.

In action at	Killed.		Wounded.		Total killed and wounded.	Classified location of wounds.					Total.
	Officers.	Enlisted men.	Officers.	Enlisted men.		Head.	Chest.	Abdomen.	Upper extremity.	Lower extremity.	
Tientsin, July 13:											
Ninth Infantry	1	18	5	72	96	14	12	11	26	33	96
Yangtsun, August 6:											
Battery F, Fifth Artillery	......	......	......	1	......	......	......	......	......	......	......
Ninth Infantry	......	......	1	5	......	......	......	......	......	......	......
Fourteenth Infantry	......	7	......	51	65	12	6	4	14	29	65
Pekin, August 14:											
Hospital Corps	......	......	......	1	......	......	......	......	......	......	......
Fourteenth Infantry	......	......	......	8	9	......	1	......	1	7	9
Pekin, August 15:											
Battery F, Fifth Artillery	1	......	......	1	......	......	......	......	......	......	......
Ninth Infantry	......	2	......	3	......	......	......	......	......	......	......
Fourteenth Infantry	......	3	......	13	23	3	4	......	3	13	23
About 6 miles southwest Tientsin, August 19:											
Sixth Cavalry	......	......	......	6	6	1	1	......	2	2	6
Total	2	30	6	161	199	30	24	15	46	84	199

The losses of the United States Marine Corps were: At Tientsin, July 13, killed, 4; wounded, 27; Yangtsun, August 6, wounded, 1; Pekin, August 15, wounded, 1; total killed 4, wounded 29. Total of killed and wounded of the United States forces in the Pekin relief column, 232.

Summary of deaths, period July 12 to September 25, 1900.

Classification:	
Gunshot wounds, killed in action	32
Effect gunshot wounds received in action	14
Heat exhaustion	1
Insolation	2
Dysentery	17
Tuberculosis, pulmonary	1
Typhoid fever	2
Cerebrospinal meningitis	1
Suicide (gunshot wound)	1
Unknown, killed in action	1
Total number of deaths	72
By gunshot wounds ....per cent	66⅔
By disease ....do	33⅓

Summary of the personnel of the medical department serving with the troops in China, September 25, 1900.

Medical officers	10
Contract surgeons	21
Hospital stewards	4
Acting hospital stewards	13
Privates	137

REPORT OF MAJ. FRANK J. IVES, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON CHINA RELIEF EXPEDITION.

PEKIN, CHINA, *April 5, 1901.*

I have the honor to submit the following report of the medical department of the China relief expedition for the period from September 24, 1900, to March 31, 1901, during which time the undersigned served as chief surgeon thereof.

The United States forces in China in September, 1900, consisted of 144 officers and 3,900 enlisted men of the United States Army, and two battalions, each consisting of four companies of United States marines, numbering in all about 800 men, making a total strength of approximately 5,000. Although these marines were a component part of the command, the medical officers on duty with them, who were naval officers, were not required to make the reports incidental to the Army. As these marines left China early in November, I was unable to obtain any records of sickness among them, so that all data quoted in this report pertains solely to the Army. It is presumed that these naval medical officers submitted all necessary reports to the chief of their department.

In the latter portion of September, 1900, our forces were divided into two brigades stationed, respectively, at Pekin and Tientsin, with scattered detachments along the Pei Ho at Peitsang, Yangtsun, Hoshiwu, Matao, and Tungchow, the latter being about 16 miles from Pekin and the nearest point to that city on the river. Owing to the railroad between Pekin and Tientsin not being in operation, it became necessary to ship all supplies by junks on the river, thus necessitating strong garrisons along the waterway, to which the American forces contributed its quota at the places above enumerated. The junks were towed by coolies, and as not more than 15 or 20 miles per day could be traveled it required seven or eight days to make the journey between the two cities. In December the railroad was put in operation and all supplies were subsequently shipped thereby.

Upon assuming the duties of my office I found that a base hospital of 150 beds, under command of Maj. William Stephenson, surgeon, United States Army, and known as the "General Hospital at Tientsin," had been established and was in successful operation at that place. This hospital was well equipped with an adequate quantity of all necessary medical supplies, there being on hand a sufficient reserve for expansion to 300 beds should the emergency for such arise. The personnel of this institution consisted of 7 assistant surgeons, about 40 members of the Hospital

Corps, and 15 trained female nurses. It received the sick not only from the command in Tientsin, but such severe cases from Pekin and the river detachments as could with safety be transferred. In this connection I would state that the journey down the river was speedy and comfortable, and the sick thus transported were, as far as known, in no case injured by the trip. They were invariably accompanied by surgeons and suitable attendants, and everything possible done for their well-being and comfort. The hospital at Tientsin was from time to time depleted by transferring many of the sick to the hospital ship *Relief*, then at anchor at Taku. It was discontinued on November 11, as the American forces at that time had been mostly withdrawn from China, and the garrison at Tientsin had been reduced to two companies of infantry.

The condition of the command in Pekin in September was such as might invariably be expected after the rough and trying experiences to which it had been exposed. What was designated a field hospital had been located in one of the large buildings in the Temple of Agriculture. It was under command of Capt. W. F. Lewis, assistant surgeon, United States Army, and a certain degree of organization had been effected. The sick were segregated and a diet kitchen established. There were in use a number of "Gold Medal" cots, which had been furnished by Captain Ramsay, regimental quartermaster of the Ninth Infantry. In addition to these, a few hand litters were used as cots, but some of the sick were obliged to sleep on the floor, as the cots and litters were inadequate for all, there being about 150 sick in the hospital at that time. There was no hospital bedding, clothing, nor furniture. The sick were forced to wear the clothing in which they entered the hospital, but there was a fair allowance of blankets and Chinese bedding to render them comparatively comfortable. Major Stephenson was directed by wire to ship at once a suitable amount of bedding, clothing, and other necessary supplies from his surplus stores, which, upon their arrival, relieved the most pressing wants until the permanent hospitals were established.

The War Department having decided upon the strength of the command to remain in China during the winter, I was directed by the commanding general of the China relief expedition to make suitable arrangements for the care and accommodation of the sick of a command of about 2,000 for one year. Of this force, two companies of infantry were to garrison Tientsin, the post being designated Liscum Barracks, one company at Tungchow, and the remainder to take station in Pekin. The garrison in Pekin was divided into three sections, the military post known as "Camp Reilly," situated in the Temple of Agriculture, and two detachments, each consisting of two companies of infantry, doing police and provost duty in the two American sections of the city, one in that portion known as the "Tartar," and the other in the "Chinese" city.

The Temple of Agriculture is a large oval inclosure situated in the extreme southern section of the Chinese city, surrounded by a massive brick wall 15 or 20 feet in height with only two gates or entrances, and inclosing about 300 acres. The ground is elevated above the surroundings, is well drained, and in no place are the city residences in juxtaposition to the wall. The inclosure is divided by walls into five or six smaller inclosures, and in the center are situated the altars, temple buildings, and residences of the priests and caretakers. The ground is covered with grass, and there are groves and avenues of cedar trees, many of great age and proportionate size. This site was selected by the commanding general shortly after the military occupation of Pekin, for the use of the American forces, and for hygienic and military reasons a more desirable location could not have been fixed upon.

Medical supplies.—During October an immense quantity and assortment of medical supplies arrived from San Francisco and Manila. These were intended to equip a medical supply depot in China, to be under the charge of Maj. E. T. Comegys, surgeon, United States Army, who had reported for duty in September. Owing to the withdrawal of a large portion of the troops, this station was never established. Such of these supplies as were needed for the command were sorted out and retained, and the balance, by direction of the commanding general, turned over to the quartermaster's department for shipment to the medical supply depot in Manila. The selection and separation of these supplies was attended with serious difficulty, owing to the absence of any marks or lists by which the contents of many of the boxes and packing cases could be determined. Such information is usually shown on the packers' lists, but it has been my experience that the latter are rarely available, especially when most needed. Not only were there many packages unmarked, but I was informed that in some instances old boxes had been used, from which the marks of some previous shipment had not been obliterated. In the present instance a great deal of unnecessary labor could have been avoided had the markings on the packages shown the contents in a more definite manner. It was particularly aggravating to open box after box to find out they contained nothing that was required.

I am not familiar with the regulations governing the shipment of supplies from a medical supply depot, but would urgently recommend that each package shipped should first have every other mark carefully obliterated and then be legibly stamped with, (1) name of depot or consignor, (2) date of invoice, (3) the number, (4) name and address of consignee, (5) contents, (6) the red cross. It has been suggested by Maj. J. C. Byron, depot quartermaster in Pekin, that where packages contain a miscellaneous assortment of articles, tin envelopes with a movable flap or lid be securely attached to the box. The box is marked as above enumerated, with the exception of the list of contents, and into these envelopes cards can be inserted containing all the above data, including a complete list of contents. For a long shipment, three or four or more similar cards to be placed in each envelope, so that one can be retained by each quartermaster through whose hands the consignment passes. This would enable each to keep an accurate check on every article received and shipped by him, and would be of great service to the medical officer ultimately receiving them. Should any article be removed from the case, a note to that effect could be made on the card. The clerical work incidental to manifolding the cards could be easily reduced by means of the mimeograph or other manifolding appliances. Shipping quartermasters have informed me that the red cross mark on the package has proved most valuable in enabling a rapid separation of medical from other property, especially when the shipment is large and supplies from other departments are mixed together. In the case of boxes it should always be placed on the two ends, so as to be visible when they are piled in tiers.

Hospitals.—On September 27, 1900, I addressed a letter to the adjutant-general, urging the immediate establishment of permanent hospital arrangements for the command in Pekin, and submitted plans for the conversion of some of the Chinese buildings in the Temple of Agriculture into a hospital of 150 beds. These plans were such as to render it easy to expand or contract the size of the hospital, should the occasion for such arise. With some alterations these plans were adopted, and what was officially designated as "United States Military Hospital No. 1" was established. This hospital had a fixed capacity of 85 beds, which could be increased to 100 by crowding, and still further enlarged as above mentioned by occupying adjacent buildings, should the necessity present itself. It was imperative that the sick be provided for before the advent of the winter season, and as there was no time to construct suitable wards, it became necessary to utilize such Chinese buildings as were available for hospital quarters. These buildings, owing to their peculiar construction, were poorly adapted for such purposes unless materially altered. They were constructed of massive walls, were closed on all sides except toward the front, and the interiors consisted in each case of one large hall extending to the roof. The two buildings utilized for wards were respectively 30 and 32 feet in depth and about 25 feet in height from the floor to the center of the roof. The roofs were of the curved, sloping design peculiar to all Chinese buildings. The fronts of these buildings had no windows, but consisted of a continuous series of doors about 3 feet wide and 8 feet in height, so that the entire front could, if desired, be thrown open. The main difficulty, therefore, was to provide for suitable heating, lighting, and ventilation. The doors above mentioned were not made of solid wood, but were constructed of an open lattice work, covered on the inner side with white paper. This system of using lattice work covered with paper for doors, windows, and even entire sides of buildings is largely in vogue in China, and seems to serve a very useful purpose. It is cheap, the heat in winter time is retained, and considerable light admitted.

In the present instance all these doors, except a few retained for egress and ingress, were closed and securely sealed. In every alternate one a glass window 3 by 3 feet was inserted, which could be opened when desired. Suitable partitions were then erected to divide the interiors to suit the requirements, and 11-foot ceilings constructed. These ceilings were entirely of Chinese design and conception. They consisted of a light bamboo or reed framework, upon which a layer of brown paper, and over this one of ordinary wall paper, were pasted. Although of the flimsiest character, they proved most serviceable, provided due care was exercised in preventing sudden drafts from without. On one occasion during a high wind an outside door was held open, which caused such a strong draft that the entire ceiling of one ward was torn from its fastenings and lifted several feet, resulting in its almost complete destruction. By observing proper precautions this did not occur again. By thus cutting off the spacious lofts above the wards the latter were most comfortably heated by excellent coal stoves furnished by the quartermaster's department. The wards were ventilated by means of the windows, and every 15 feet along the center of the ceiling there was an opening 18 inches square. In the loft there was an opening about 1 foot square every 15 feet just below the eaves, and at each end, very near the angle of the roof, a window about 18 inches in diameter, which could be opened or closed by means of cords worked from below. By these means the ventilation was at all times good. All the interior walls were hung with white wall paper of a neat pattern, which made the wards and other rooms present a bright, cheerful, and attractive appearance. An 8-foot inclosed brick passageway was constructed, connecting the two main buildings, which being properly heated, served also as a recreation and smoking room for the convalescent patients. A sink, with earth closets, which could be emptied from without, was also constructed, opening from the passageway.

A building originally intended for a laundry was built in the southeast angle of the court, but was ultimately utilized as a dining room for the detachment and such patients as were not subsisted in the diet kitchen. Another building was suitably partitioned and utilized for administration purposes and quarters for the medical officers. The enlisted men of the detachment of the hospital corps, like all enlisted men attached to Camp Reilly, occupied hospital tents within the hospital inclosures. Two isolation wards made of hospital tents were erected in the southwest corner of the inclosure, but no occasion arose for their use.

This hospital was excellently equipped with a full assortment of medicines, surgical dressings, and hospital stores of all kinds. The folding field furniture was used in the wards and proved most servicable, with the exception of the folding cots with woven-wire mattresses. In most cases these were frail and became easily broken, being inferior to the adjustable folding cots with canvas bottoms. The "Gold Medal" cot was not used in this hospital after the other cots were received, but it proved one of the most useful and serviceable articles issued to our troops. Too much can not be said in praise of this cot for troops in the field, and for a movable field hospital I do not believe any other can compare with it for compactness, lightness, and strength. The new model, which stands higher from the ground, is a decided improvement, especially for hospital purposes.

The operating room was excellently equipped and lighted by means of a large window cut in the south side of the main building. The new mess chests, with service for 100, were used in the dining room. This chest gave the utmost satisfaction. The kitchens were plentifully supplied with all necessary culinary apparatus, and the field ranges furnished by the Quartermaster Department, which were used by all the troops, proved most excellent. I mention these details merely to show that our sick received almost the same care and comfort which would be possible in any of our military hospitals in the United States.

This hospital was commanded by First Lieut. H. S. Greenleaf, assistant surgeon, United States Army. Under him were 3 assistants, about 40 members of the hospital corps, and 6 trained female nurses. The diet kitchen was admirably managed, and everything was done conducive to the welfare of the sick. I do not believe it would be amiss to state that the United States Military Hospital No. 1, in Pekin, was, in point of equipment, the most complete hospital among the allied forces in north China, and it reflected in the most favorable manner upon the Medical Department of the Army. Lieutenant Greenleaf proved himself an efficient and capable officer, and a large part of the success of this hospital was due to his untiring energy and ability.

Military Hospital No. 2 was located in the American section of the Chinese city. Its capacity was 30 beds. It was originally intended for officers and selected cases among the enlisted men. At the time of the withdrawal of the troops in November, 1900, it was under discussion whether or not some of the female nurses then at Tientsin be retained in China during the winter. As there were no accommodations for them in the Temple of Agriculture, it was determined to establish a small hospital in the city where they could all reside and those on duty at hospital No. 1 be each day sent to that place. The plan at first appeared a little cumbersome, but it worked smoothly. The services of these nurses proved most valuable and contributed much to the efficiency of the department. This hospital, under the efficient management of Contract Surg. J. T. Halsell, United States Army, proved of great service and more than fulfilled its original requirements. It was located in the building used by the Canton Club and received the sick from the provost guard. It was discontinued as a separate organization in the latter portion of February and its personnel attached to hospital No. 1.

A 20-bed post hospital was established at Liscum Barracks in Tientsin, and a 6-bed hospital at Tungchow.

Sanitary conditions.—Owing to the apparently total lack of all sanitation on the part of the Chinese, and the indescribably filthy condition of their towns and cities, the sanitary environments at first presented a discouraging outlook. The surface drainage is crude, and although there is no sewer system a few imperfectly constructed underground drains were observed. All trash and refuse is usually thrown into the street.

where it is liable to remain undisturbed indefinitely. In a Chinese house but little garbage exists and that is usually thrown into the streets and devoured by dogs, which are plentiful and seem the natural scavengers. There are apparently no water-closets in the private houses. In all the better classes of residences a small oblong hole about a foot in depth is dug in some secluded angle of the inclosure. This is emptied from time to time, the contents being carried by coolies to a public dumping ground. These privies are used by the women and children, and only in the better class of people by the men. Throughout the city public inclosures are located for "defecatorios." These are used by the poorer classes of men and boys, who merely use the ground, as there are no privies, seats, or even sinks. When the ground in these becomes impassable for pedestrians the night soil is collected and taken to the dumping grounds. Toward the outskirts of the city these "defecatorios," as they were designated, cease to exist, and the male population utilize vacant lots, angles in the walls, and even the public highways. The night soil is considered a valuable asset for fertilizing purposes, and it is therefore not difficult to arrange for its removal. It is collected in certain outlying sections (the dumping grounds previously referred to), where it is piled, awaiting its ultimate transportation to the country. This system is extremely crude and indescribably offensive, and although it may not be the means of contaminating the drinking water, it affords every facility for conveying disease through the medium of flies and dust.

The experiences of the past three years in Cuba and the Philippines, however, have to a large extent familiarized the American Army with the most efficient methods of dealing in such cases, so within a reasonably short period those sections of Pekin controlled by our troops were in a comparatively clean condition.

Quarters.—The troops stationed at "Camp Reilly" in Pekin were housed in tents, all others occupied Chinese houses, which had been previously thoroughly cleaned and put in proper condition for habitation. Considerable discussion arose in the early fall as to the risk of subjecting troops, so lately from the Tropics, to so rigorous a climate with only canvas as a shelter, and many were the forebodings as to the direful results of such a procedure. The undersigned, as chief surgeon, did not see fit to submit recommendations against the occupying of tents, as he believed it was better to remain in the Temple of Agriculture, regardless of the character of shelter to be provided. Had there been opportunity to erect suitable barracks in the inclosure there would have been no argument, but the winter was approaching and skilled labor was difficult to procure, so that the question sifted down to remaining in the Temple of Agriculture under canvas, or occupying Chinese quarters in the thickly settled portion of the city. The former course was adopted with the most gratifying results. Considerable inconveniences and personal discomforts are unquestionably engendered by tent life, but in the present instance these were minimized as far as possible. The tents used were the walled conical, made of drab canvas. I believe that drab or other dark color is unsuitable for ordinary camp use. The interior of the tent is too dark, causing unnecessary discomfort for the occupants and making it more difficult to keep clean. The tents were heated by Sibley stoves converted into coal stoves by erecting an ovenlike base of brick about 3 feet square and 18 inches high. The central portion was hollow, opening above and to the front. An iron grate was fixed in the upper opening and the stove rested over this, being sunk about an inch into the cement top of the oven. These stoves worked admirably and maintained as comparatively even a temperature as is possible under canvas. A few fires occurred, but none of a serious character. One occurred in the hospital, in the tents used by the medical officers for their mess. In this case four hospital tents were consumed, with almost all their contents. The fire spread so rapidly that but little could be removed. The rapid destruction of these tents indicated very clearly to my mind that tents should never be used for housing the sick in winter time unless no other shelter is available, as in case of a fire it would be impossible to remove those inmates unable to escape unassisted. In the present instance the canvas was extremely dry, owing to the extreme dryness of the atmosphere. Still, it must be borne in mind that even in moderately humid climates the heat from the stoves soon dries the canvas most thoroughly and renders it very inflammable.

Bedding and clothing.—All our troops were supplied with "Gold Medal" cots. The clothing was adequate and suitable for the climate. For troops serving in the field a khaki uniform made of some suitable woolen fabric would be more serviceable than the regulation blue. The latter is kept neat and clean with difficulty. In camp it soon becomes dirty and unsightly, and gives the entire command a slovenly and discreditable appearance.

Food.—The subsistence department was abundantly provided, not only with all the component parts of the ration, but with a large assortment of extra supplies. Native beef and mutton were readily procurable. The quality of this meat, although inferior to the corn-fed beef from our packing houses, compared favorably with the average range cattle of the plains. Considerable rinderpest existed among the cattle in the vicinity of Pekin, and at one time some cases appeared in the commissary herd, but as far as could be ascertained all so diseased were killed, and if any escaped detection and were issued no injurious results followed. Besides the beef and mutton, poultry and eggs were cheap and plentiful. An excellent bakery was established, and an abundance of well-baked, wholesome bread was available. For service in North China the ration as now authorized is excellent in every particular, as is well testified to by the healthy condition of the command and the few cases of digestive diseases.

Water.—All drinking water in Pekin was obtained from wells, the water level being about 30 feet below the surface. These wells are thickly scattered throughout the city, and as there is absolutely no attempt at sewerage one would infer that most of them would be contaminated. Although many unquestionably were, still, where sufficiently removed from adjacent residences, the water in many seemed wholesome. All the water is hard and loaded with salts. In some wells it was found quite brackish to the taste, in others sweet and agreeable. An analysis made for me in the laboratory of one of the German military hospitals of the water taken from a well in the Temple of Agriculture showed an abundance of chlorides and other salts, but no organic matter. In the Temple of Agriculture the water was at first obtained from two wells in the compound ultimately occupied by Military Hospital No. 1, but subsequently the depot quartermaster dug three other wells, as the supply from the first two was inadequate. The water in all was of the same quality, and from the five wells an abundance was obtained for all purposes.

Five distilling plants, each with an alleged capacity of 600 gallons per day, were provided for the expedition. Of these one was put in operation in the fall and another later on in the winter, orders being issued and enforced, requiring the water from these plants to be used for drinking purposes by all troops at headquarters and at Camp Reilly. Shortly after the first plant was erected it was reported to my office by a medical officer that the water was not being properly distilled, but flowed from the coils in almost the same condition as when leaving the well. The matter was at once, and repeatedly afterwards, brought to the attention of the authorities and referred to the depot quartermaster, under whose supervision the plants were being operated, but without material results. The command in the meanwhile used the water as issued, with no noticeable ill effects, a fortuitous circumstance due to the remoteness of the wells from all sources of contamination. Although no evil result followed, it was, nevertheless, unfortunate that after all the expense and trouble incidental to transporting these plants to China they should not have served their legitimate purpose.

Bathing facilities.—The two distilling plants mentioned in the previous paragraph, although distinct failures in so far as furnishing distilled drinking water is concerned, served a most useful purpose in heating the bathrooms and water for bathing. Two commodious buildings adjacent to the men's quarters were obtained and fitted up with facilities for supplying baths for about 20 men each. The distilling plants were located in these, the fire from the boilers rendering the interior temperature of the room warm and comfortable. By turning steam into large caldrons kept filled with water direct from the well an abundance of warm water for bathing was available.

Climate.—The climate of North China during the winter season is bracing, invigorating, and well calculated to produce robustness and healthfulness. The atmosphere is extremely dry, and there is no sudden variation in temperature. From November 1, 1900, to April 1, 1901, there was no rainfall and only two very light falls of snow. There were no facilities for taking maximum and minimum temperatures, but observations were taken and recorded at military hospital No. 1, of the temperature at the hours of 7 a. m. and 7 p. m. During the month of January the maximum temperature thus observed was + 35° F., and the minimum + 2°; the average morning temperature was + 16°, the average evening temperature + 20°. As this month was the coldest during the winter, the above figures give a comparative idea of the daily temperature. Owing to the aridness of the atmosphere and absence of precipitation, the ground becomes very dry, and the soil being alluvial is soon ground into a fine powder along the roads and thoroughfares, few of which are paved. This section of China is visited every few weeks by severe winds of several days' duration. As a result, dust storms of indescribable severity are developed, and constitute one of the most insanitary conditions of Pekin, in addition to causing great bodily discomfort and annoyance. In each case after a storm of this character the sick report materially increased, the additional causes of admissions being affections of the respiratory organs, including pneumonia and bronchitis. Being appointed on a sanitary commission, in conjunction with medical officers from other branches of the cooperating forces, the purpose being to devise measures for the proper sanitation of the city of Pekin, I brought this matter into prominence, recommending most urgently that means be adopted for street sprinkling. This was subsequently done, resulting in the greatest benefit to all the foreign residents.

Health of the command.—During that period of the military occupation prior to October 1, 1900, the sick report, although large, was in no manner excessive when the severity of the campaign and attending circumstances are taken into consideration. Many of the troops actively engaged, having previously been on duty in Cuba and the Philippine Islands, were necessarily debilitated and proper subjects for disease incidental to a campaign. Digestive diseases, including diarrhea and dysentery, led all others with a total of 2,426 cases, or 43.5 per cent of all. Malarial fever came next with 651, or 11.6 per cent. Accidents and injuries, 577, or 10.3 per cent. Respiratory, 568, or 10.1 per cent. Venereal, 451, or 8 per cent. Cutaneous, 360, or 6.4 per cent, and the others scattering. There was but 1 case of measles and 77 of typhoid fever. All of these latter occurred in the summer and fall, except three, which developed in December. Of the 353 cases of dysentery 351 occurred prior to December 1, and of the 1,710 cases of diarrhea 1,602 occurred prior to November 1. Under the heading accidents and injuries, 258 cases out of a total of 577 occurred during August; these included 14 killed and 100 wounded during the campaign from Tientsin to Pekin and 100 cases of heat exhaustion on that march.

During the winter an excellent opportunity was afforded for meeting the medical officers of the various armies and observing the equipment and organization of their departments. In all cases the medical officers were courteous and cordial in their manner and gave the impression of being men of intelligence and ability.

Equipment.—After a careful examination of the equipment of the various forces in China, I have no hesitation in asserting that the medical department of the United States Army is the best and most intelligently equipped of any service there represented.

Ambulances.—With the exception of the United States the Germans were the only contingent having an ambulance for the transportation of the sick. The British had a two-wheeled vehicle, the "tonga," also known as a "dhanjiboy," used by the Indian troops, which could transport about four in a sitting or semi-reclining position. This was drawn by two animals and was well adapted for a rough, hilly country, but did not present especial advantages over an ordinary ambulance. A comparison as to the relative merits of the American and German ambulances, according to my idea, is absolutely in favor of the former. Our wagon is considerably lighter and in emergency can be handled by two instead of four animals, which is hardly possible with the German. The seating capacity of both is the same, but in an emergency we can load six reclining patients, whereas the other has reached its limit with four. In the German ambulance the seats are arranged somewhat similar to our old-style ambulance, and when in use are rather unstable and rickety. For reclining patients they use the regulation hand litter, four of which belong to each vehicle. It is difficult to conceive of a more simple, compact, and practical method than our present arrangement of making the seats and back serve as litter beds. Unfortunately the ambulances actually in use by our army in Pekin were old, dilapidated, and out of date, so that we were not in a position to demonstrate our superiority except by explaining to our visitors what improvements had been made.

The hand litter in our Army is, for strength, lightness, compactibility, and comfort the superior of any seen in China. The British troops were supplied with what is known as the "dhoolie" litter, of which there are several varieties. The ordinary dhoolie used by the Indian troops weighs 71 pounds. It consists of two A-shaped frames, between which the litter bottom is stretched, suspended at the apex to a large bamboo pole, by means of which the litter is carried upon the shoulders of the bearers, usually four in number. When resting on the ground, the prolongations of the A serve as legs, and a curtain or hood is hung on the framework above the patient to protect him from the sun or rain. There have recently been two modifications to this litter, the Ames and Kay dhoolies. Each reduce the weight to 50 pounds. In the former there is an arrangement by which the litter bottom can be reversed and used as a hammock. The Kay dhoolie can be carried either by hand or suspended to a pole. In the mountainous regions of India, where coolie labor is plentiful and cheap, these litters undoubtedly serve a most useful purpose, but I do not believe them practical in ordinary warfare.

When it may be necessary to carry the sick or wounded a great distance and no wheel or horse transportation is available, I believe this can be accomplished with less difficulty by means of a litter suspended from a pole and carried on the shoulders of the bearers rather than by hand. This would be especially true in locations where coolie or other cheap native labor can be obtained. Our litter might readily be converted into one of this kind by adopting some simple device such as a set consisting of two iron rings 3 or 4 inches in diameter, upon each of which is attached by a closed loop two iron rods, each terminating in a circular ring of sufficient size to fit over the handles of the litter. This would be packed or carried detached from the litter until required for use.

The German litter is heavy and cumbersome and presents no single feature for special commendation. That used by the French army is in many respects similar to the German, but has wooden legs and does not seem as strong or durable.

The Japanese have two litters—a light stretcher without legs, consisting of two bamboo poles, with iron braces and a canvas litter bottom; the second is what they call a "rickshaw" litter, being nothing more than an ordinary "rickshaw" with a sufficiently long body to permit the patient to rest in a half reclining position. Although the Japanese have never had practical experience with these rickshaw litters in actual warfare (those in China were received after the active campaign was ended), I believe they will prove most useful, and the question of experimenting with them in our service would be well worth the effort. The Japanese hand litter is nothing more than a light stretcher, and, having no legs, can only be used for the actual transportation of the sick or wounded. They are admirably adapted for use on the battlefield to transport the wounded from the firing line to the dressing stations, but otherwise do not compare in strength, utility, and comfort to the litter in our service.

In this connection I would state that several years ago the undersigned gave considerable attention toward devising a light stretcher for field use, and at the annual meeting of the Association of Military Surgeons of the United States, held in Washington in May, 1894, he read a paper on that subject, at the same time exhibiting a bamboo litter which he believed might answer the purpose. I still am of the opinion that such a stretcher would be a valuable adjunct to our field equipment in ordinary civilized warfare, the chief advantages being that a large consignment of litters could be rapidly pushed to the front, thus obviating the necessity of improvising, which has practically been shown to be not only a slow and laborious progress but in many instances an impossibility.

First aid packages.—All of the troops of the various cooperating forces were supplied with first-aid packages more or less similar to that in use in our service, although none were as complete. The Japanese contains 1 triangular bandage, 3 compresses of gauze, and a safety pin; the German 1 bandage, 2 gauze compresses, 1 safety pin; the British, 1 piece macintosh 12 by 6, 1 gauze bandage about 12 feet in length, 1 compress. In the British Indian service there is also a triangular bandage; the French, 1 charpie enveloped in gauze, 1 bandage, 1 compress, and 2 safety pins; the Italian, 2 gauze compresses, 1 bandage, and pins. By comparing the contents of these various first-aid packages I believe that the one adopted for our army is superior. The contents of ours seems of better quality than most, and although somewhat more bulky, I believe that the additional articles thus furnished more than counterbalance the slightly increased weight and size.

Hospital corps pouches.—In addition to the first-aid packages the members of the hospital corps of the various foreign contingents were equipped with pouches carried by a sling over the shoulder and containing a specified list of medical supplies. These pouches in many respects resembled that furnished our army, and I observed no feature worthy of special commendation. In the French army, however, they use saddlebags for the cavalry service. In this connection I would invite attention to the fact that the slings for our pouches have been reported as not sufficiently secured. This has been especially observable with mounted men, the jolting of the horse causing one or both fastenings of the sling to give way, which on the march is a most serious defect, there being no means of making the necessary repairs, and the pouch is thereby rendered useless. The French saddlebags present many advantages, but it should be borne in mind that in actual warfare a man is frequently separated from his horse, and when a command is fighting dismounted members of the hospital corps on duty with it should be at or near the firing line. In this case the pouch slung over the shoulder would be of greater service.

Medical and surgical chests.—In the Japanese service each battalion is allowed one set of chests, two in number, a medical and surgical. These panniers are constructed of wickerwork, inclosed in a strong leather case. They are somewhat larger than those in our service, but the contents are, in my opinion, not nearly so complete. The French have a set of four panniers for each regiment, the arrangements and contents of which do not present any special feature for remark. They are constructed of wickerwork and are practically obsolete. The British medical chests comprise a set of ten, of equal size and about the same dimensions as ours. This set is one of the component portions of what is known as a "section," which is actually one-fourth of a field hospital. Each field hospital has a capacity of 100 beds, and the entire personnel and equipment is specified in regulations. The hospital is subdivided into four sections, each identical in personnel and equipment. The field hospitals are numbered from one upward, and the four sections are designated as A, B, C, D. The section is therefore an independent 25-bed hospital. The chests and everything pertaining to the equipment of the section are distinctly marked, "Field Hospital, No. —," "Section A," as the case may be. The contents of the chests are in many respects obsolete; there is very little idea of compactness and some of the British medical officers admitted that for actual utility they could be vastly improved upon. Assuming that a section is about equivalent to a regimental field hospital, their ten chests in no way compare with our present regimental set, consisting of the medical, surgical, sterilizing, and detachment chests, the box of additional dressings, and the field desk. The German army was, as far as observed, not equipped with medical panniers or chests of any kind, their medicine wagon being apparently substituted. These wagons are of two kinds, furnished respectively for battalions and field hospitals. Of the former, one is supplied each battalion (1,000 men), and of the latter, two to each field hospital. The wagons are divided into compartments opening to the sides and rear, and are very serviceable and complete. Those for the field hospital are considerably heavier than the others, and would on ordinary rough roads require four animals, although on the smooth roads of the continent two might be sufficient. The interior arrangement consists principally of a series of drawers resting on the side and slid into the bed of the wagon by small rollers. These drawers, when pulled out, present the appearance of small cabinets about 3 feet square, open at the front. They are rather elegant in design, and when arranged around a room in two rows, one above the other, give very much the appearance of a well-appointed dispensary. The contents are well secured, the bottles are square and arranged in slots on shelves, so that the danger of breaking is slight. The medicines in these wagons are principally tabloids, and the dressings are well selected and of good quality. There was considerable dispensary paraphernalia, such as mortars and pestles, etc., which in their various compartments looked very well, but I believe the space thus employed might be better utilized. The tabloids are more bulky than those in our service, and in nearly every case had the name and quantity of the drug printed on each tabloid. This wagon has the advantage of enabling a larger and more complete assortment of medical supplies to accompany each command. Its chief disadvantage is that should one or more of the animals assigned it die, become sick, or be arbitrarily withdrawn by the commanding officer, the entire fabric goes to pieces, which might not necessarily be the case with a set of chests.

Transportation for field medical supplies.—In this respect I believe the United States Army is inferior to the German, British, Japanese, French, and possibly many others. In our service the Medical Department, being dependent for the transportation of its supplies entirely upon the Quartermaster's Department, is seriously handicapped and frequently made subject to criticism which should not justly be laid at its door. When a regiment goes into active service, a certain portion of the medical supplies, in addition to what is carried by the men, should at all times be in touch with the troops and available for use at short notice. These supplies should include the medical and surgical chests, additional dressings, litters, and such other articles as may be designated by the Surgeon-General as belonging to a regimental equipment. The German medicine wagon fulfills these conditions, but in the French and Japanese services each regiment is furnished with a small one-horse vehicle on two wheels, for the sole purpose of carrying these supplies. Such a wagon can be so constructed as to readily follow troops in all but the most difficult mountainous country, to be sufficiently strong to stand the usual wear and tear of the service, and light enough to require but one animal on ordinary roads. The Japanese wagon was small, low, and moderately broad, constructed very much on the plan of railroad station trucks for handling baggage.

At present in our service the medical chests, litters, and other necessary articles are packed securely in one of the wagons of the regular wagon train, which is possibly miles in the rear and never available in case of emergency. I believe a light wagon as above described would prove far more serviceable than pack animals, unless the troops were operating in a country impassable for wheel transportation of any kind. Another important element is that the Geneva Convention does not recognize the quartermaster's transportation, and troops on the firing line should be provided with a distinctive wagon bearing the red cross, which could not under any circumstances be diverted by commanding officers to illegitimate uses. As a matter of fact, this should apply to all medical transportation, but it is especially applicable to the wagons under consideration.

The Russian troops withdrew from Pekin before an opportunity was afforded to inspect their equipment, but one article used by them on the march struck me as most serviceable in times of actual warfare. This was a large, circular metal caldron with a closed lid, having a capacity of 25 or 30 gallons, supported on wheels, the bottom of the caldron being 10 or 12 inches from the ground. This was easily drawn by one horse or mule. It is used for making soup or stew. In the Santiago campaign such an apparatus for our troops would have been of incalculable benefit.

Military hospitals.—Although the various hospitals in Pekin were originally organized as field hospitals in the strict sense of the term, when the permanent garrisons were established efforts were made to equip the individual hospitals to as high a standard of perfection as possible.

The Germans had two field hospitals of 200 beds each and a marine hospital of 100 beds. These were located in Chinese buildings in sections of the city convenient to their troops. The general equipment, as compared to the United States Military Hospital No. 1, was crude. The cots were of iron and folded in the center, making a rather unwieldy and weighty package 3 by 3 feet, of such a nature as to be difficult to transport and pack. I saw no effort to provide other folding furniture, and the bedside stands, tables, chairs, and benches seemed to have been rather roughly extemporized. Some mattresses were in use, although bed sacks filled with straw were employed to a considerable extent. There seemed to be a good allowance of blankets and bed linen of suitable quality. All patients not in bed were required to wear hospital clothing made from material resembling bed ticking. The kitchen was well and systematically regulated; in it was hung a large blackboard from 4 to 5 feet square, lined and ruled in white paint with the vertical columns for the various kinds of diet, and the number of each ward on the horizontal lines. This served as an excellent general guide for the cooks. The quality and quantity of the food was good, but in no way compared to the commissary department of our army. The wards were well ventilated and heated by means of large brick ovens constructed in each. A bathroom was attached to each ward, and the arrangements for removing the night soil were sanitary. Each hospital was provided with an excellently equipped operating room. Excellent disinfecting plants were established in each for bedding, clothing, etc., and also a well-equipped bacteriological and chemical laboratory. In these last two respects the Germans were superior to any of the forces in Pekin, including our own; but otherwise our equipment was in every way more serviceable and complete. After the United States, the Germans came next in point of hospital equipments. I endeavored to ascertain the extent and character of the prevailing diseases amongst them, but their medical officers seemed unwilling to impart information. However, in going through their wards, the large number of cases of typhoid fever and dysentery was apparent to the most casual observer; in fact, at times an entire ward, with 20 or more patients, seemed affected with these diseases. As my visits were made during February and March, when there were practically no typhoid and dysentery amongst the American troops, it would look as if our sanitary measures were superior, both of the above being preventable diseases.

The personnel of a German field hospital consists of 6 commissioned medical officers (the senior with the rank of major), 1 chief steward (who seems to rank higher than the hospital stewards in the United States Army, being, I should judge, similar to the highest warrant officers in the Navy), 11 noncommissioned officers, 12 nurses, privates, 1 wagon master, 18 men (laborers), 1 bookkeeper, 1 druggist—a total of 6 commissioned and 45 enlisted men.

British.—The British had but one hospital in Pekin, situated in a new and spacious compound known as the Chee Foo palace. With the exception of a limited number of iron cots and bedding, this hospital had practically no equipment beyond that of the regulation field hospital. It consisted in part of two field hospitals of four sections each, thus affording separate organizations for the native Indian and British troops. The division is essential in that service with mixed commands, owing to caste prejudices and the necessity of preparing the food in certain ways for the natives. The British hospital was clean, well ventilated, and the usual sanitary regulations enforced. Their kitchen and mess equipment seemed deficient, and no system nor arrangements for special diets for the sick were noticed.

There did not appear to be an unusual amount of sickness amongst the British and native troops, the character of diseases among the former being very similar to that amongst the Americans. I believe smallpox broke out amongst them, but only a few cases occurred, and no epidemic was even threatened. A very singular feature about the native troops is their apparent immunity from typhoid fever. Although totally unaccustomed to the vigorous climate of north China, they seemed to stand the winter well, and comparatively few succumbed to pneumonia and other pulmonary diseases.

Japanese.—The Japanese had 2 field hospitals of 200 beds each. These were arranged very much on the order of the German, but were not so comfortably equipped. The cots were principally extemporized and the bedding, clothing, etc., of a crude quality. Their operating room was provided with an excellent assortment of surgical instruments, belonging to the field equipment. One of the principal diseases amongst them was beri-beri. There were some cases of typhoid. I do not believe they suffered as extensively from diarrhea, dysentery, and digestive diseases as the European and American troops. This would be easily accounted for, from the similarity of the food and natural conditions of the country.

Organization.—As the Medical Department of the United States Army is practically without any specific organization, they were in that respect different from any of the allied forces in Pekin.

A careful study of the various organizations reveals the fact that whereas they are for the most part suitable for coherent masses of large bodies of troops, they are not well adapted for the scattered detachment service, such as our Army is liable to perform. The problem then arises, Can a system be devised which can be readily convertible to both conditions? The British system is very similar to that in our Army with the addition of the regularly organized and equipped field hospitals previously mentioned. This latter gives them a certain mobility which is sadly lacking in our service. For instance, when the various brigades of British troops were ordered from India to China, the commanding general in his order merely designated that such and such field hospitals (giving numbers) should accompany the command. This was all that was necessary, and a few words expressed what in our service would have required much previous thought and calculation to effect.

The Japanese organization is on a more elaborate scale than others. Each regiment has 6 medical officers, 3 hospital stewards, 12 privates of the hospital corps, and 48 assistant stretcher bearers (4 from each company) detailed from the line. In addition to these there is a sanitary corps of 500 men for each division. This is usually under command of a field officer of the line and is divided into 2 companies of 250 men each. One of these companies carry the wounded from the first dressing stations to the second line, known as the "collecting stations," and the second company carry them from there to the field hospitals. This force of hospital men comprises over 6 per cent of the total command.

In the German army there are 6 medical officers with each regiment, 2 to each battalion. One noncommissioned officer of the hospital corps is assigned to each company, and 4 men from each company are designated as company bearers. In addition to this, each division has one company, consisting of 6 medical officers and 100 enlisted men, who act as litter bearers. This company has 8 ambulances and 72 litters. It advances as near as possible to the firing line without unnecessary risk, and there establishes stations, to which the wounded are brought by the company bearers. The sanitary corps then takes charge and transports the wounded to the rear. In addition to the above, each division has 6 field hospitals of 200 beds each. A division consists of 4 infantry regiments of 3,000 men and such artillery and cavalry as may be assigned it.

Each French regiment has 4 medical officers and 12 enlisted men of the hospital corps, 1 to each company. As in the German and Japanese services, company bearers are detailed from the line. The wounded on the firing line are carried to the first dressing stations and from there to what is designated their ambulance stations. Here the function of the company bearers cease. These ambulance stations are in reality temporary field hospitals, with a capacity of about 50 patients. There is apparently only one of these ambulance stations to a division. Still farther to the rear there are, for an army corps, 6 field hospitals of about 100 beds each. Behind these are the general and base hospitals. I was unable to obtain figures as to the complement of officers and enlisted men for these various hospitals, but inferred from remarks of the medical officers that the strength of the hospital corps was about 4 per cent of the total strength of the command.

It is thus seen that in the principal foreign armies the system of company bearers seems to be generally adopted. I inquired as to the use of musicians for hospital purposes on the battlefield, but was unable to obtain much satisfaction.

To minutely relate all one's observations and impressions during this remarkable period would require more space than the limits of an ordinary report would warrant. I have therefore endeavored to restrict my remarks to what appeared to me the most salient features, and as such respectfully submit them.

In conclusion, I would state that the conduct of the medical officers and enlisted men of the hospital corps of our army was such as to reflect credit upon the department. Their duties were performed in a thorough and efficient manner, as was amply demonstrated in the admirable results obtained. These results brought the medical department prominently forward as an evidence of the efficiency of the United States Army, and enabled it to contribute its quota to the laurels won in the presence of the combined armies of the world.

PREVALENCE OF SPECIAL DISEASES.

SCARLET FEVER, DIPHTHERIA, MUMPS, MEASLES, ETC.

Cases of scarlet fever, diphtheria, and cerebrospinal fever were, as usual, rare among the troops. Measles and mumps were, on the other hand, of quite frequent occurrence. In the United States measles had an admission rate of 11.36, the mean annual rate for the previous decade having been 8.46 per thousand of strength. The infection of this disease was imported into the Philippine Islands on almost every transport. The admission rate for volunteers in these islands was 8.18 per thousand of strength, and for regulars 1.61. Similar rates prevailed as regards mumps.

REPORT OF EPIDEMIC DISEASES ON THE UNITED STATES ARMY TRANSPORT KILPATRICK, DATED MANILA HARBOR, MAY 13, 1901, BY CONTRACT SURGEON JOHN P. KELLY, UNITED STATES ARMY.

I have the honor to forward the following report of the recent outbreak of epidemic diseases on board the U. S. army transport *Kilpatrick:*

Measles made its appearance on board April 5, 1901, in the case of a private of Company G, Fifteenth Cavalry; other cases followed in rapid succession. Several of the patients stated that the disease prevailed at the Presidio of San Francisco and Angel Island, Cal., at the time of their departure from said places to join the *Kilpatrick;* anyway, there were about eight or ten of the patients in the incubative stage of the disease when they came on board this ship.

Variola was the next infectious disease to make its appearance in the case of a private of Company M, Eleventh Infantry, a recruit enlisted March 22, 1901, at Minneapolis, Minn. He arrived at San Francisco, Cal., April 1, 1901, and was sent on board the *Kilpatrick* April 5, where he was admitted to hospital April 6. Another case of variola was admitted to hospital April 7, that of a private of Company M, Eleventh Infantry, a recruit enlisted March 26, 1901, at Oklahoma City. He arrived at San Francisco, Cal., March 30, and was sent on board the *Kilpatrick* April 5, 1901. Both of these patients stated that variola prevailed at their places of enlistment at the time of their departure to join the troops at San Francisco, Cal. One stated that variola was very prevalent at Oklahoma City while he was there. He also said that while working in that city just previous to enlisting he would often meet cases of variola on the streets while going to and from his work; that the city authorities at first tried to quarantine certain smallpox districts, but that the disease became so widely disseminated and was of such a mild type that the people did not think it of enough importance to take to their bed and be treated; deaths due to the disease were rare. Taking the statements of these two patients, together with the fact that they were the only ones on board to develop the disease at that time, and considering the incubative stage (twelve to sixteen days) of the disease, I hardly think there is any reason to doubt that these men were infected at their places of enlistment. The third case of variola was that of a sergeant of Company I, Eleventh Infantry, admitted to hospital April 24, 1901. This man was no doubt infected by the previous cases.

Mumps next manifested itself in the case of a private of Company M, Eleventh Infantry, admitted April 11. Patient stated that the disease prevailed at the Presidio of San Francisco, Cal., where he was stationed previous to joining the transport *Kilpatrick*, April 5, 1901.

No other case of mumps followed this until April 28, when a second case appeared, followed in rapid succession by several others.

Measles progressed until April 26, at which time it began to decline gradually. Treatment was as follows: Acetanilid for high temperature, diaphoretics to assist in bringing the eruption well to the surface, regulating the excretory channels, liquid diet, and rest in bed. For variola: Removal to isolation ward, immediate vaccination, acetanilid for high temperature, chloral hydrate and bromide of potassium for restlessness; room darkened; plenty of ventilation; inunction with ichthyol ointment, 1 dram to the ounce of petrolatum spissum; nutritious diet, and rest in bed.

Mumps continued to increase until five or six days before reaching Manila, P. I. Treatment: Regulation of the excretory channels, rubbing the swollen glands with camphorated oil, in some instances using equal parts of glycerin and alcoholic extract of belladonna; lead and opium lotion in cases of orchitis.

The means used to prevent the further spread of these diseases were immediate isolation of patients along with their effects, fumigating by the burning of sulphur, and the walls and floors scrubbed with 1 to 500 bichloride of mercury solution. The quarters of the troops were thoroughly fumigated and disinfected. Vaccination of all on board not previously vaccinated and revaccination of those not exhibiting satisfactory and recent cicatrices. Rigid inspections of the entire ship daily and the laws of hygiene enforced to the letter.

Below will be found a list of patients transferred to the United States Marine-Hospital Service quarantine and detention station at Honolulu (between the dates April 13 and 21, 1901, respectively) while quarantined off the harbor of the above-named place. A second list gives the total number of cases of infectious diseases originating on board since leaving San Francisco, Cal., April 5, until anchoring in Manila Bay, May 12, 1901.

Transferred to United States Marine-Hospital Service quarantine and detention station at Honolulu.

	Cases.
Measles	29
Smallpox	2
Mumps	1
Lobar pneumonia	2
Urinary fistula	1

to pass through this detention station to United States Army hospital at Honolulu for treatment.

List of cases of contagious and infectious diseases originating on board since leaving San Francisco, Cal.

	Cases.
Smallpox	3
Measles	31
Mumps	32
Lobar pneumonia	2
Total	68

No death occurred on board during the voyage. The *Kilpatrick* anchored in Manila Harbor at 7 p. m., May 12, 1901.

Report of Capt. Frank P. Kenyon, Assistant Surgeon, United States Volunteers, on Measles and Mumps on the Transport Hancock, dated Manila Harbor, April 18, 1901.

On March 25, 1901, I sailed from San Francisco, Cal., on the U. S. army transport *Hancock*, in charge of four troops of the Sixth United States Cavalry and four companies of the Seventh United States Infantry, composed of 14 officers and 885 enlisted men. On March 28, four days out, 2 cases of measles were discovered, one in the cavalry and one in the infantry. These cases with their effects were promptly placed in the isolated hospital and all commanding officers were instructed to notify their medical officers of any indisposition among the troops. On reaching Honolulu, March 31, these cases were transferred to the military hospital at that place.

On April 9, twelve days later, 3 cases of measles developed; and from April 9 to 12, 24 other cases appeared, about equally divided between the cavalry and infantry. These cases were promptly placed in hospital and the attendants strictly quarantined, no one having any duties about the hospital being allowed to come in contact with any other member of the ship. Up to this date no other case has developed.

Considering that measles broke out simultaneously in two distinct troops, with many new recruits on board ship, I think we were very successful in checking the disease.

Twenty-three cases of mumps also developed en route, 2 having come on board at San Francisco.

All cases of measles and mumps were promptly isolated, including their attendants. Several cases of the latter disease are still under treatment in hospital.

TYPHOID FEVER.

No epidemic of typhoid fever occurred among the troops during the year. In the Army as a whole the admission rate was 9.74 per thousand of strength and the death rate 1.63, as compared with the mean annual rates, 5.19 and 0.56, for the ten years preceding the outbreak of the Spanish-American war. Among the troops in the United States the admission rate was 5.56 and the death rate 0.43 per thousand of strength. The largest admission rate was given by the command in China, 27.73 per thousand, and the largest death rate 2.11, by the troops in the Philippines. The smallest prevalence was reported from Cuba, 4.72 per thousand men, with a mortality of 0.92 per thousand. In addition to these, there was quite a large admission rate for fevers of undetermined causation, most of them probably typhoid fever of mild character, as these cases had practically no death rate. When these rates are compared with the admission rate, 141.59, and the death rate, 14.83 per thousand of strength in 1898, and the corresponding rates, 20.69 and 2.44 in 1899, the satisfactory record of the past year is manifest.

YELLOW FEVER.

During the calendar year 1900 there were 144 cases of this disease, 32 of which were fatal, reported from the Army, showing for the whole Army, regulars and volunteers, with a strength of 100,389 men, an admission rate of 1.43 and a death rate of 0.32 per thousand of strength. During the decade 1889–1898, the mean annual admission rate was 2.08 and the death rate 0.25 per thousand men. The cause of this gratifying decrease in the prevalence of this dangerous disease is explained, page 179 of this report, under the heading "Board for the study of the etiology and prevention of yellow fever."

MALARIAL FEVERS.

The rates for malarial disease were heavy during the year, owing to the great prevalence of these diseases in the Philippines and Cuba. The admission rate for the whole Army was 706.52 and the death rate 1.36, as compared with the mean annual rates of the decade 1889–1898, 174.29 and 0.58. The rates for the volunteers in the Philippines were: Admission, 1108.75, and death, 1.98; for the regulars, 742.82 and 1.64, respectively, per thousand of strength. Cuba followed with an admission rate of 581.35 and a death rate of 1.04. In Porto Rico and China the prevalence and mortality were relatively light. In the United States the admission rate was 166.20 and the death rate 0.05 per thousand of strength.

During the current year so much has been done in the practical application of methods for the prevention of malarial diseases, based on the diffusion of our knowledge of the means by which these diseases are propagated by infected mosquitoes, that a safe prognostication may be given of a lessened nonefficiency from these diseases in the next report of the Surgeon-General of the Army. On October 15, 1900, a circular from the headquarters Department of Western Cuba was published for the information and guidance of post commanders. It embodied the recommendations of the chief surgeon, Maj. Jefferson R. Kean, surgeon, United States Volunteers, and required action to be taken as thus recommended. The same requirements were afterwards, December 21, 1900, published in General Orders, No. 6, Headquarters Department of Cuba. These called for the use of mosquito bars in all barracks and especially in all hospitals, and for the destruction of the larvæ or young mosquito, commonly known as wiggletails or wigglers, by the use of petroleum on the water where they breed. According to the order:

> The mosquito does not fly far, and seeks shelter when the wind blows; so it is usually the case that every community breeds its own supply of mosquitoes in water barrels, fire buckets, or undrained puddles, post holes, etc. An application of one ounce of kerosene to each 15 square feet of water once a month will destroy not only all the young but the adults who come to lay their eggs. The water in any cistern or tank is not affected in the least for drinking or washing purposes if only it is drawn from below and not dipped out. For pools or puddles of a somewhat permanent character draining or filling up is the best remedy. It is recommended that the medical officer who makes the sanitary inspection at each post be charged with the supervision of the details of these precautions.

Subsequent to this, sanitary reports from every post in Cuba made note of the relative prevalence of mosquitoes and of malarial fevers during the previous months and of compliance with the provisions of General Orders, No. 6. Special attention was always given to such places as bell traps not in frequent use, fire buckets, and generally to all accumulations of standing water which might serve as breeding places for the mosquito, even to such small collections as are found in the hoof prints of animals in soft or marshy ground. In several instances the recommendation was made that the long grass in the neighborhood of the barracks, which serves as a place of rest for mosquitoes during the day, be cut close to the ground, and in others that the officers of the post be assembled at such time and place as the commanding officer may direct to hear the views of the surgeon on the rôle played by the mosquitoes in the propagation of yellow fever and malarial diseases, and the means of suppressing these diseases.

As illustrating the benefit resulting from these measures, the chief surgeon of the department states that, for the week ending June 23, 1900, there were 34 cases of malarial fever under treatment at Rowell Barracks, Cienfuegos, while a year afterwards, during the week ending June 22, 1901, there was not a single case.

EXTRACTS FROM SANITARY REPORTS FOR MARCH, 1901, FROM CUBAN POSTS.

Rowell Barracks, Cuba, First Lieut. Albert E. Truby, assistant surgeon, United States Army.—Practically no mosquitoes. *Culex fasciatus* and *Culex pungens* only species found during past month. No recent cases of malaria. This condition due to excellent drainage and constant vigilance to prevent propagation. Oil and covers used to all standing water.

Columbia Barracks, Habana, Cuba, Maj. J. R. Kean, surgeon, United States Army.—Mosquitoes have been rare at this post until the last week, when they have been quite numerous. Breeding places in the post and vicinity have been sought for without success. As south winds have in the past been prevalent, during this time it is possible that they have come from beyond the inspected zone, and observations in Marianao and its vicinity are being made. Petroleum is used on all standing water on the reservation, and steps are being taken to screen all buildings occupied by the garrison as barracks and quarters, and by the sick. *Culex pungens* is the only variety found during the month. Four cases of malaria have been admitted during the month, of which only one, a civilian teamster, seems to have been a primary affection.

Pirotecnia Militar, Habana, Cuba, Contract Surg. E. B. Barnet, United States Army.—Mosquitoes are not abundant in and about this post at the present season. The most common are the *Culex pungens*, *Culex fasciatus*, and a few specimens of *Anopheles*. They come through the wind, as there are no stagnant waters in these surroundings. Crude petroleum is put in every place where water is kept. We have not had a single case of fever at this post during this month.

Headquarters of Artillery, Defenses of Habana, Cuba, Vedado, Habana, Cuba, Contract Surg. P. C. Field, United States Army.—Mosquitoes much less noticeable than same date last year. Ordinary species, but *Culex fasciatus* less frequently seen. All varieties in large numbers with south wind. No breeding place discovered within military zone of camp. Seventeenth, Twenty-second, and Twenty-fourth Companies, Coast Artillery. Crude oil has been very carefully used at possible breeding places. No new malarial patients at this hospital during the month.

Hamilton Barracks, Matanzas, Cuba, Capt. J. Hamilton Stone, assistant surgeon, United States Army.—With difficulty a few mosquitoes can be found, but they are not troublesome. The *Culex* is the prevailing species; rarely an *Anopheles* is seen. There has been a marked reduction in the number of cases of malarial fever since existing orders have been complied with.

Yellow-fever hospital, Santiago, Cuba, Lieut. George A. McHenry, assistant surgeon, United States Army.—Mosquitoes exist at the yellow-fever hospital in varying numbers, depending largely on the direction of the wind; the yellow-fever hospital grounds are bounded on the north by an extensive marsh, an ideal breeding place for mosquitoes, and in the absence of the sea breeze they are here in immense numbers and very troublesome. They are the *Culex fasciatus* species. Water barrels and all collections of fresh water are kept covered with mineral oil and the grounds are kept hoed clean from vegetation.

Santa Clara Barracks, Habana, Cuba, Contract Surg. E. B. Barnet, United States Army.—Very few mosquitoes are found in or about the quarters of this post at present. Those seen are as a rule *Culex fasciatus*, only an occasional *Anopheles* being seen. Breeding places near post all dried up for the last three weeks. Larvæ are destroyed by covering all breeding places within 500 yards of the post with crude petroleum. Those present believed to have been carried here from inland by south winds, which at times prevail. No malaria at this post during the month.

Lieut. J. R. Devereux, assistant surgeon, United States Army, made some interesting observations on the prevalence of malarial fevers at Washington Barracks, D. C., and at the general hospital on the reservation of that post from April 1, 1900, to September 1, 1901. He shows in his report that the barracks and the general hospital are about 1,000 yards apart, but in other respects are apparently under similar conditions as regards malarial diseases. The average temperature, rainfall, and wind velocity are practically the same in both localities. In 1900, 4.4 per cent of the hospital corps detachment at the General Hospital were affected with malarial fevers while the garrison of the post had 27.3 affected. In 1901 the hospital corps men had 3.4 per cent affected and the garrison 6 per cent. In the former year the barracks rooms of the hospital corps men were well screened while those of the post were not thus protected. During the latter year the barracks of the post were screened and vigorous efforts made for the destruction of the mosquitoes on the reservation.

CONSUMPTION.

For tuberculosis of the lungs the admission rate for the year, 4.92 per thousand of strength, was much higher than the mean annual rate of the previous decade, 2.66. The rate of discharge for disability was 1.36, as compared with 1.40 for the previous ten years, and the death rate, 0.96, as compared with 0.48 as the mean annual rate for the decade. The admission rate was higher, 5.27, in the United States than in any of the other commands except that serving in China, where a rate of 7.70 was recorded. The lowest rate, 3.80, was recorded in Cuba, but this does not mean that the prevalence of consumption in the West India Islands is notably less than in the United States, for the command in Porto Rico gave an admission rate of 4.59 per thousand of strength. It is believed that the sanatorium for consumptives recently established at Fort Bayard, N. Mex., will be of great value in the recovery of incipient cases of this disease. Of 167 patients who had been under treatment an average of 5.4 months and were discharged during the year ended June 30, 1901, 10 were clinically cured, 26 were convalescent, and 73 improved.

VENEREAL DISEASES.

The admission rate for these diseases for the whole Army during the year 1900, was 133.97, and the discharge rate 2.36 per thousand of strength, as compared with 133 and 2.61 during 1899, and with 71.45 and 1.22, the mean annual rates of the decade 1889–1898. These large rates prevailed in all the commands except among the volunteer troops serving in the Philippines, the admission rate for these having been 79.94, and the rate of discharge 0.41 per thousand of strength. Among the regular troops in the Philippines the rates were respectively 138.88 and 0.96; among troops serving in the United States, 155.39 and 7.29. In China the admissions rose to 173.60, but there was no discharge for disability. In Cuba the admission rate reached 190.68, with 4.03 discharges per thousand of strength, and in Porto Rico the excessive admission rate of 367.88 was reached.

The following tabulation shows the relative prevalence of these diseases among the various commands by comparative rates of admission per thousand of strength during the year, together with the discharge rates indicating the permanent disability caused by them:

	Syphilis and results.		Gonorrhea.		Chancroids.		Total.	
	Admissions.	Discharges.	Admissions.	Discharges.	Admissions.	Discharges.	Admissions.	Discharges.
Troops in the United States	19.62	5.46	102.42	1.64	33.35	0.19	155.39	7.29
Volunteers in Philippines	10.05	.35	45.78	.03	24.11	.03	79.94	.41
Regulars in Philippines	14.75	.73	77.67	.23	46.46	....	138.88	.96
Troops in China	9.24	....	99.13	....	65.23	....	173.60	....
Troops in Cuba	26.47	2.53	111.85	1.50	52.36	....	190.68	4.03
Troops in Porto Rico	44.03	.92	194.04	.92	129.81	....	367.88	1.84
Total Army	15.83	1.73	78.69	.58	39.45	.05	133.97	2.36

Since the close of the calendar year, reports from the chief surgeon of the division of the Philippines show these diseases to have increased materially in their prevalence. In April, 1901, they constituted 20.42 per cent of the total sickness as compared with 8.97 per cent in September, 1900. The board of health of Manila has instituted measures for the control of these infections among the women of the town, including the segregation of prostitutes in a certain part of the city and a careful system of superintendence over them. Orders have been issued directing an inspection of the troops at regular intervals, with the intention of detecting all diseased soldiers and sending them to hospital for treatment. The carrying out of these orders for the examination of all enlisted men has added to the sick list many cases that would have otherwise been treated privately and not appeared on the sick reports. Los Banos on Laguna de Bay, which has hot springs closely resembling in composition those of the hot springs of Arkansas, has been selected as a suitable place for the treatment of syphilitics, and some of these cases are now there undergoing treatment.

Similar efforts have been made in Cuba and Porto Rico to control these diseases.

In the report of an inspection of the hospital at Calamba, province of Laguna, dated February 24, 1901, Maj. L. M. Maus, surgeon, U. S.

Army, sanitary inspector of the division of the Philippines, states that although about 50 per cent of the troops in garrison at Calamba were affected with venereal diseases, only 15 cases were under treatment in hospital, some in quarters, while a large number of men treated themselves or went without medical care for the sake of preserving a clean medical record. He states that:

> An examination system, with certificates, has been adopted for the women of the town, the examinations being conducted by Contract Surgeon Smith, but it has not appeared to lessen the evil. It is believed that the well women pass their certificates around to their less fortunate sisters during business hours, and hence the inefficiency of the system. The matter has attracted considerable official attention at Calamba, and the district commander has ordered the post commander to deport all women found diseased, the place of deportation and method of getting other corporations to accept them being left to the ingenuity of the commanding officers. So far nothing has been done in this regard, on account of the difficulties involved. The question is a serious one and should be solved without delay. So long as our troops remain stationed in small towns which are practically under the control of military authority, a thorough examination of public women should be required and the diseased ones sent to an improvised hospital supported by the town, until cured. Strict rules should be issued on this subject for the punishment of those who attempt to leave the hospital until pronounced well. Unless something is done immediately, from 20 to 40 per cent of troops stationed in provincial towns are liable to become incapacitated for military duty more or less from this cause.

ALCOHOLISM.

The admission rate for alcoholism in the Army as a whole during the year 1900 was 15.34 per thousand of strength, as compared with 14.49 in 1899 and with 28.67, the mean annual rate of the decade 1889–1898. Troops serving in the United States during the past year had 22.43 admissions per thousand of strength. The steady decrease of late years in the admissions for alcoholism among men of the Regular Army is a matter for congratulation. Military officers may be said to be unanimous in their opinion that this was mainly the result of the establishment of the post exchange or canteen at military posts. The following shows this gradual improvement: Mean annual admission rate of the decade ending with 1889, 56.68 per thousand of strength. Admission rate for 1889, 41.41; for 1890, 40.73; for 1891, 40.01; for 1892, 37.23; for 1893, 33.97; for 1894, 30.94; for 1895, 30.11; for 1896, 29.06, and for 1897, 27.86. In 1898 the altered conditions consequent on the Spanish-American war prevented further comparisons. There is less drunkenness among troops in active service than in a command doing garrison duty in times of peace. In the Philippines during the past year the admission rate for alcoholism among the Volunteers was 8.68, and for Regulars 12.41; for troops in China, 7.70. These statistics do not sustain the newspaper reports of drunkenness among the troops in the Philippines. In fact, medical officers report the habits of the enlisted men in the Philippines as very much the same as in the United States. Much of the evil effects of intemperance in the Philippines is attributed to the use of the native intoxicant, vino, which is a crudely distilled alcohol, causing rapid intoxication, which is readily recovered from when a moderate quantity is taken, but which, taken in excess, causes wild delirium and unconsciousness, and in habitual users induces a deterioration of the mental faculties.

A sample of this vino obtained from the factory when it was manufactured, was examined by Contract Surg. William Roberts, at the military hospital, Dagupan, P. I., and was found to contain 33 per cent of alcohols belonging to the methyl and ethyl series, 11 per cent of the former and 22 per cent of the latter. Methyl alcohol constitutes the active poisonous agent of this mixture, and is derived from the juice of the nipa. The ethyl alcohol is produced by the fermentation of crude sugar added to the nipa juice, and is no more poisonous than the ordinary form of alcohol found in sherry wine or other grape juice fermentations. Vino is the first distillate of the fermented juice of the nipa plus cane sugar, and contains besides the methyl alcohol or wood spirit, traces of amyl, propyl, butyl, and other alcohols, the mixture being known under the common term fusel oil. It is always present in the first distillate of alcoholic liquors, and vino represents all that is bad in this respect.

INSANITY.

Of insanity 273 cases were reported, equivalent to an annual rate of 2.72 per thousand of strength. Of these cases 149, or somewhat more than one-half, were discharged from the service and sent to the Government Hospital for the Insane at Washington, D. C., for treatment. The remaining 124 cases were returned to duty at various periods after having been taken on the sick report. The admission rate in 1899 was 1.78, and the proportion of those sent to the Government Hospital formed 0.87 per thousand of the strength. The increase during the past year is explained by the nervous depression and homesickness among the relatively larger proportion of the strength of the Army serving in the Philippines. Twenty-three cases were reported from the home stations, equivalent to 1.38 per thousand of the strength; 3 cases from Porto Rico, also equivalent to 1.38 per 1,000 men; 14 cases from Cuba, equivalent to a rate of 1.61; 7 cases from China, equivalent to 3.60; 99 cases from the Regular troops in the Philippines, equivalent to 2.79, and 123 cases from the Volunteer troops in the Pacific islands, equivalent to a rate of 3.90.

DIARRHEAL DISEASES.

During the year 1897, when all the troops of the United States served at the home stations, the admission rate for diarrheal diseases was 73.77 per thousand of strength, with no death. Dysentery was a comparatively rare disease and seldom fatal. During the decade ended December 31, 1897, the mean annual rate of admissions was 91.06, and the death rate 0.06. In 1898, as a result of war service in Cuba, Porto Rico, and the Philippines, the admission rate rose to 388.62, and the increased gravity of the cases was manifested by a death rate of 1.45 per thousand of the strength. During the following year, 1899, the admission rate was 380.69, with a death rate of 2.14. During the past year the admission rate increased to 465.01 and the death rate to 6.47, on account of the relatively large proportion of the Army which was exposed to the causes of diarrheal and dysenteric diseases in the Division of the Philippines. Among troops serving in the United States the admission rate was only 96.57; in Porto Rico, 148.17, and in Cuba, 166.75, and the death rates in these commands were relatively small. But in the Philippines, among the regulars, the admission rate was 488.25, and among the volunteers, 736.05, while among the troops engaged in the dangerous campaign in China it rose to 1,266.54 per thousand of the strength. The heavy mortality rates occurred in these commands. Among the Pacific Islands the death rate was 7.47 per thousand of strength; among the volunteers, 10.88, and among the troops of the China relief expedition, 15.92.

The following tabulation shows, in the various commands, the admission rate for acute and chronic dysentery and other diarrheal diseases, with the absolute number of cases, of discharges for disability, and of deaths referred to each of these headings. It is evident, however, from the large number of deaths attributed to diarrheal diseases other than dysentery that many cases of the latter disease must have been reported as diarrheas.

Location of troops and disease.	Admission rate per 1,000 of strength.	Number of cases.	Number of discharges.	Number of deaths.
United States:				
Dysentery—				
Acute	3.77	78	.....	.....
Chronic	3	62	17	3
Other diarrheal diseases	89.80	1,858	6	1
Total	96.57	1,998	23	4
Porto Rico:				
Dysentery—				
Acute	27.52	60	.....	1
Chronic	1.38	3	.....	1
Other diarrheal diseases	119.27	260	5	.....
Total	148.17	323	5	2
Cuba:				
Dysentery—				
Acute	30.61	266	1	5
Chronic	2.42	21	1	.....
Other diarrheal diseases	133.72	1,162	1	.....
Total	166.75	1,449	3	5
Philippine Islands:				
Regulars—				
Dysentery—				
Acute	74.82	2,652	5	69
Chronic	38.85	1,377	64	165
Other diarrheal diseases	374.58	13,278	34	31
Total	488.25	17,307	103	265
Volunteers—				
Dysentery—				
Acute	93.56	2,941	.....	136
Chronic	51.57	1,621	25	154
Other diarrheal diseases	590.92	18,575	16	52
Total	736.05	23,137	41	342
China:				
Dysentery—				
Acute	175.64	342	1	18
Chronic	49.30	96	4	13
Other diarrheal diseases	1,041.60	2,028	1	.....
Total	1,266.54	2,466	6	31
The Army:				
Dysentery—				
Acute	63.15	6,339	7	229
Chronic	31.68	3,180	111	336
Other diarrheal diseases	370.18	37,161	63	84
Total	465.01	46,680	181	649

PTOMAINE POISONING.

Two instances of ptomaine poisoning occurred in the Army since my last annual report. In one case the command affected was Company G, Twelfth Infantry, stationed at Bamban, Tarlac, P. I. Capt.

E. C. Poey, assistant surgeon, United States Volunteers, attributed the attack to certain cans of evaporated cream used in making a bread pudding for supper April 16, 1901. At 12.30 a. m., April 17, the first of the series of cases reported sick with headache, vomiting, diarrhea, muscular prostration, cold, clammy sweats, a rapid and feeble pulse, and violent cramps. By 3 a. m. there were several cases with similar symptoms. At noon 25 to 30 men were under treatment. Altogether about 40 men suffered. Many of the cases were very severe, but no death occurred.

In the other instance report was made from Fort McPherson, Ga., by Lieut. Charles C. Greer, assistant surgeon, United States Army, that on September 4, 1901, 175 men were added to the sick report suffering from ptomaine poisoning, probably due to the fact that the food used at supper and breakfast before the outbreak had been allowed to stand too long in certain metal containers. These were of a cheap variety, and had a seam around the bottom which could not be easily cleaned even when scrubbed with a stiff brush. The prevailing symptoms were nausea, vomiting, purging, severe abdominal pains, back ache, headache, fever (103° to 106° F.), rapid pulse, and general prostration. Twenty per cent of the cases were severe, and a few were extremely ill, but there was no death. Lieutenant Greer commended the hospital corps men for their efficient work during the two days of this trying ordeal.

DISEASES OF THE RESPIRATORY ORGANS.

Diseases of the respiratory organs among troops in the United States gave an admission rate of 76.48 and a death rate of 0.56 per thousand of strength, as compared with 202.34 and 1.47 in 1899, and with 102.21 and 0.69, respectively, the mean annual rates of the decade 1889–98.

Bronchitis gave a rate of 84.39 in the United States. The exposures of the troops during the active campaign in China caused a rate of 92.45, but in the islands this affection was infrequent, the rate in Cuba having been only 29.34, in Porto Rico 29.82, and in the Pacific islands, among the regulars 34.59 and among the volunteers 44.60.

Pneumonia, also, had its highest prevalence in the United States, 4.25 per thousand of strength, followed in China by a rate of 3.08, while in Cuba the rate was only 1.61, in Porto Rico 2.29, and in the Pacific islands 2.12 among the regulars and 2.61 among the volunteers. The death rate, however, from this disease was highest among the volunteer troops in the Philippines, 0.76 per thousand men, as compared with 0.25 among the regular troops serving with them and with 0.34 among the troops serving in the United States.

SPECIAL MEDICAL REPORTS RENDERED TO JUNE 30, 1901.

Name.	Rank.	Report.
Appel, D. M	Major and surgeon	Pulmonary and laryngeal tuberculosis, clinical history. Pulmonary tuberculosis, 3 cases, thermographs only.
Arwine, Jas. T	Contract surgeon	Syphilis.
Ashford, B. K	First lieutenant and assistant surgeon.	Copy of chapter on "Uncinariosis" written for Dr. Cabot's work on blood analysis.
Banister, W. B	Major and surgeon	Report of the China relief expedition.
Barber, A. W	Contract surgeon	Smallpox at Fort D. A. Russell, Wyo.
Borden, W. C	Major and surgeon	Diphtheria.
Bradley, A. E	Captain and assistant surgeon.	Do.

Special medical reports rendered to June 30, 1901—Continued.

Name.	Rank.	Report.
Carr, L. C	Major and surgeon, volunteers.	Santiago as a yellow-fever center.
Cattermole, C. A	Captain and assistant surgeon, volunteers.	Vaccinia.
Curry, Jos. J	do	Diseases of the Philippines. Malta fever.[1]
Curtis, J. W	Contract surgeon	Smallpox at Tagudin, Philippines.
DeKrafft, S. C	Captain and assistant surgeon, volunteers.	Hæmoglobinuric fever.
DeMey, C. F	do	Beriberi.
DeNiedeman, Wm	Major and surgeon, volunteers.	Abscess of liver.
Dunshie, J. F	Contract surgeon	Yellow fever at Guanajay Barracks, Cuba.
Egan, P. R	Major and surgeon	Meat ration in the Tropics.[2]
Flagg, C. E. B	Captain and assistant surgeon.	Rubella. Secondary syphilis. Typhoid fever, 2 cases.
Frick, E. B	do	Value of blood examinations in obstetrics.
Girard, A. C	Lieutenant-colonel and deputy surgeon-general.	Report of autopsies made during August, September, October, November, and December, 1900. Report of autopsies made during, January, February, and March, 1901.
Godfrey, G. C. M	Captain and assistant surgeon.	Yellow fever at Pinar del Rio, Cuba. May, June, and July.
Gorgas, W. C	Major and surgeon	Report of the work of the sanitary department, Habana, Cuba, year of 1900.
Gregory, W. G	Contract surgeon	Tuberculosis.
Hoff, J. Van R	Major and surgeon	Annual report Department of Porto Rico, June 30, 1900.
Howard, D. C	Captain and assistant surgeon.	Scarlet fever.
Kelly, John P	Contract surgeon	Epidemic diseases on transport Kilpatrick.
Latimer, C. H	do	Report relative to insane cases treated at the First Reserve Hospital, Manila, P. I.
Mason, C. F	Captain and assistant surgeon.	Observations on diseases of the Tropics.
Morris, E. R	Major and surgeon	Primary dementia.
Owen, W. O	do	Paper entitled, "Does physical law apply to the human body."
Poey, E. C	Captain and assistant surgeon, volunteers.	Report on epidemic of gastro-enteritis at Bamban, Tarlac, P. I.
Raymond, H. I	Captain and assistant surgeon.	Chronic dysentery.
Raynor, W. J	Captain and assistant surgeon, volunteers.	Care of the feet in the Tropics.
Roberts, Wm	First lieutenant and assistant surgeon.	Report on the chemistry of vino.
Shockley, M. A. W	do	Smallpox at Fort Niobrara, Nebr.
Stearns, C. H	Captain and assistant surgeon, volunteers.	Pernicious malarial fever.
Stone, J. H	First lieutenant and assistant surgeon.	Typhus fever, sporadic case, Matanzas, Cuba. Myiosis, parasitic invasion of the nares.
Strong, R. P	do	Report of a case of infection with Balantidium coli. Report of a case of infection with Strongyloides intestinalis.
Stunkard, Thos. C	Contract surgeon	Paper on the general hospital, Presidio of San Francisco, Cal.
Tesson, L. S	Major and surgeon	Poikilocytosis.
Ward, J. M	Contract surgeon	Beriberi. General tuberculosis.
Waterhouse, S. M	First lieutenant and assistant surgeon.	Insanity. Pseudo-angina pectoris. Varioloid.
Whitney, W	Major and surgeon, volunteers.	Smallpox on transport Kilpatrick.
Wilcox, T. E	Major and surgeon	Typhoid fever.
Winne, C. K	do	Angio-neurotic gangrene.
Woodruff, C. E	do	Vaccination at Fort Riley, Kans.

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[1] Published in the Boston Medical and Surgical Journal, February 21, 1901.
[2] Published in the Boston Medical and Surgical Journal, March 31, 1901.

BOARD FOR THE STUDY OF THE ETIOLOGY AND PREVENTION OF YELLOW FEVER.

In my last annual report I referred to the appointment of a board for the purpose of pursuing scientific investigation with reference to the acute infectious diseases prevailing on the island of Cuba. This board, consisting of Maj. Walter Reed, surgeon United States Army, and Contract Surgs. James Carroll, Aristides Agramonte, and Jesse W.

Lazear, United States Army, arrived at their station, Columbia Barracks, Quemados, Cuba, on June 25, 1900, and at once proceeded, under written instructions from this office, published in my last annual report, to the special study of questions relating to the causation and prevention of yellow fever.

Fortunately for the purpose of this board an epidemic of yellow fever which had begun in the adjacent town of Quemados, Cuba, during the latter part of the month of May was still prevailing, so that an opportunity was afforded for bacteriological and pathological observations in this disease. In the course of the investigations which were assiduously carried out by the members of the board during the months of July, August, and September, the results obtained, especially as relates to the mode of propagation of yellow fever by the bite of the mosquito, were such as to warrant their publication. For this purpose permission was given to Maj. Walter Reed, president of the board, to present a preliminary report at the meeting of the American Public Health Association held in Indianapolis, Ind., October 22–26, 1900.

In its experimental work during these months two of the members of the board suffered from yellow fever as the result of having been bitten by infected mosquitoes. Dr. Lazear was bitten September 13, 1900, became affected with yellow fever five days afterwards, and died September 25, 1900. Dr. Carroll was bitten August 27, 1900, and was removed to the yellow fever wards on September 1, 1900. He suffered from a severe attack of the disease, but fortunately recovered. The conclusions of the board in its preliminary report were, first, that the Bacillus icteroides (Sanarelli) stands in no causative relation to yellow fever, but when present should be considered as a secondary invader in this disease; second, that the mosquito serves as the intermediate host for the parasite of yellow fever.

As these observations, if confirmed, were of the highest importance in the future prevention of yellow fever, not only among our troops stationed on the Island of Cuba, but in our Atlantic seaports, the board was directed to continue its observations, especially along the same line of investigation.

With the approval of the military governor of the island, an experimental station was established and further observations undertaken by Major Reed and his associates. A small camp of non-immune young men, mostly belonging to the hospital corps, was formed in an open field about a mile from Quemados, Cuba. After this camp had been occupied long enough to show that yellow fever in its stage of incubation was not present, five of the men permitted themselves to be bitten by infected mosquitoes. In from 3 to 5 days each of these men became the subject of a well-defined attack of the disease and was sent to the yellow-fever hospital. In a second series of experiments, four non-immunes were injected with blood from yellow-fever patients. Each of these was attacked and sent to the fever hospital, while four of the men who had suffered an attack from infection transmitted by mosquitoes manifested no bad effect from a similar injection of yellow-fever blood. The mosquito-conveyed infection had given immunity from the disease. A third series of experiments was carried out to determine whether yellow fever can be conveyed by clothing and bedding which have been contaminated by contact with yellow-fever patients and their discharges. A small unventilated hut was built, its interior well guarded against mosquitoes by wire screens. Dr. R. P. Cooke and two hospital corps men, all of them non-immunes, passed twenty consecutive nights in this hut, sleeping in contaminated sheets and blankets taken from the beds of yellow-fever patients in the Los Animas Hospital, of Habana, Cuba. After this a fresh stock of soiled articles, including pajamas, undershirts, and nightshirts, in addition to bedding, was obtained from the fever hospital and two non-immunes occupied the room for twenty-one nights. A third time this experiment was repeated by two non-immunes for twenty nights; yellow fever was not developed in any of these experiments. Meanwhile another small hut was constructed, well ventilated and with a wire screen extending from floor to ceiling in the middle, dividing it into two compartments. Every article before admission into this room was carefully disinfected by steam. Fifteen infected mosquitoes were set free in one compartment into which a non-immune hospital corps man entered and was bitten. Four days afterwards he was removed to the yellow-fever hospital. The other compartment was occupied for eighteen nights by two non-immunes whose health remained perfect. The conclusions drawn from these experiments were:

1. The mosquito—*Culex fasciatus*—serves as the intermediate host for the parasite of yellow fever.
2. Yellow fever is transmitted to the non-immune individual by means of the bite of the mosquito that has previously fed on the blood of those sick with this disease.
3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.
4. The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.
5. Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of the disease.
6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against the subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.
7. The period of incubation in 13 cases of experimental yellow fever has varied from forty-one hours to five days and seventeen hours.
8. Yellow fever is not conveyed by fomites, and hence disinfection of articles of clothing, bedding, or merchandise, supposedly contaminated by contact with those sick with this disease, is unnecessary.
9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes capable of conveying the parasite of this disease.
10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.
11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.

Subsequent to this, and in continuation of the same line of experimental work, Major Reed and his assistants succeeded in inducing attacks of yellow fever in four other persons by means of the bites of mosquitoes that had previously bitten yellow-fever patients, thus making a total of 12 cases produced by the bites of mosquitoes. These latter cases were of special importance as showing the length of time during which the mosquito may remain capable of conveying the disease. In three of the cases the intervening period between the contamination of the insect and the production of the disease was thirty-nine, fifty-one, and fifty-seven days, respectively, thus offering an explanation of the fact that the contagion of yellow fever may cling several months to a building that has been vacated by its occupants.

or to the infected area of a town, even though the latter has been entirely depopulated.

Upon the recommendation of Major Reed further work at the experimental sanitary station near Quemados was discontinued at the end of February, 1901, and the members of the board were ordered to return to their proper station in this city, in order to give special attention to the search for the yellow-fever germ in the bodies of the infected mosquitoes which had been killed and preserved at various dates after their contamination. This investigation is still being carried on in the laboratory of the army medical school. I am very glad to be able to report that recovery took place in all patients the subjects of experimentation.

The importance and far-reaching consequences of the observations made by Major Reed and his associates at Quemados, Cuba, can hardly be overestimated. For the first time in the history of this widely prevalent tropical disease we are in possession of knowledge with regard to the manner of its propagation which will enable us, I believe, not only to check its ravages, but to effectually stamp it out whenever it may appear in any of our garrisons or cities.

With the view of promptly arresting the spread of the disease among our troops, a circular was submitted for my approval by the chief surgeon, and was published as Circular No. 5, of 1901, from the headquarters, Department of Cuba. (See p. 145.)

Already the sanitary measures which have been put in force by the health authorities in the city of Habana, based on the work of Major Reed and his associates, have resulted in absolutely ridding the city of yellow fever for the first time in more than one hundred and forty years.

EXTRACTS FROM THE PRELIMINARY NOTE OF THE BOARD FOR THE STUDY OF THE ETIOLOGY AND PREVENTION OF YELLOW FEVER.

The first part of this preliminary note will deal with the results of blood cultures during life and of cultures taken from yellow-fever cadavers, reserving for the second part a consideration of the mosquito as instrumental in the propagation of yellow fever, with observations based on the biting of non-immune human beings by mosquitoes which had fed on patients sick with yellow fever at various intervals prior to the biting.

In prosecuting the first part of our work we isolated a variety of bacteria, but of this we do not propose to speak at present. It will suffice for our purpose if we state the results as regards the finding of *Bacillus icteroides*, leaving the mention of other bacteria to our detailed report.

The cases studied during the Quemados epidemic had been diagnosed by a board of physicians, selected largely by reason of their familiarity with yellow fever. This board consisted of Drs. Nicolo Silverio, Manuel Herera, Eduardo Angles, and Acting Asst. Surg. Roger P. Ames, and Jesse W. Lazear, United States Army.

Those studied in Habana were patients in Las Animas Hospital, and had been diagnosed as such by a board of distinguished practitioners of that city.

An examination of Table I will show the character of the attacks. The milder cases studied, few in number, were attended with jaundice and albumin in the urine.

Bacillus icteroides (Sanarelli) as the cause of yellow fever.—The claim of Sanarelli for the specific character of *B. icteroides* as the causative agent in yellow fever has excited such wide attention since the publication of his observation, that it seemed to us of the first importance to give our undivided attention to the isolation of this microorganism from the blood of those sick with yellow fever, and from the blood and organs of yellow-fever cadavers.

A. *Cultures taken from the blood during life.*—The method followed was that ordinarily used in an attempt to isolate bacteria from the circulating blood, viz, from a vein at the bend of the elbow a sufficient quantity of blood was taken with an hypodermic syringe, made sterile by boiling, and after careful cleansing of the skin with soap and water, followed by equal parts of absolute alcohol and ether, and 1:2000 bichlorid solution.

Exceptionally, the blood withdrawn was plated on agar; but as a rule it was immediately transferred to sterile bouillon tubes (10 cubic centimeters) in quantities of 0.5 cubic centimeter to each of several tubes. These were then incubated at from 35° to 37° C. for a period of one week. They were examined daily, and if growth was observed plates were made in agar or gelatin, or both, and the colonies carefully studied by transference to ordinary laboratory media.

Eighteen cases have thus been carefully studied; of these 11 were designated as "severe" cases of yellow fever, with 4 deaths; 3 as "well-marked" cases, with no deaths; and 4 as "mild" cases, with no deaths.

From these 18 cases blood cultures were made, as shown in the following table:

TABLE I.—*Blood cultures during life.*

Day of disease.	Character of attack.	Number of cultures.	Number of bouillon tubes inoculated.	Bacillus icteroides.
First	Severe	3	[1]4	Negative.
Do	Well-marked	1	4	Do.
Do	Mild	1	3	Do.
Second	Severe	6	18	Do.
Do	Well-marked	1	2	Do.
Do	Mild	1	[2]3	Do.
Third	Severe	7	[2]18	Do.
Do	Mild	2	4	Do.
Fourth	Severe	5	14	Do.
Do	Well-marked	2	6	Do.
Do	Mild	1	1	Do.
Fifth	Severe	5	[1]12	Do.
Do	Well-marked	1	3	Do.
Do	Mild	1	1	Do.
Sixth	Severe	1	6	Do.
Do	Well-marked	1	2	Do.
Seventh	Severe	1	2	Do.
Do	Well-marked	1	2	Do.
Eighth	Severe	2	6	Do.
Do	Well-marked	1	2	Do.
Ninth	Severe	1	2	Do.

[1] 3 agar plates. [2] 6 agar plates.

Number of cultures	48
Number of bouillon tubes inoculated	115
Number of agar plates	18

It will be seen that of 48 separate cultures made from the blood on various days of the disease and representing 115 bouillon inoculations and 18 agar plates we failed to find *Bacillus icteroides* in any of our tubes or plates.

The results of cultures taken in 18 cases of unmistakable yellow fever, on various days of the disease, and in some cases on every day from the onset to death or recovery, would seem to exclude the presence of *Bacillus icteroides* in the blood of these cases during life.

We have already stated that we will reserve for a later report a description of the bacteria isolated from the blood in these cases. We now remark that but few organisms were obtained, and that as a rule our blood-cultures gave no growth whatever.

B. *Cultures from yellow fever cadavers.*—We tried to obtain autopsies very soon after death, and sometimes succeeded in doing so. Tubes containing about 10 cubic centimeters of flesh-peptone bouillon were generally used for the first inoculation direct from the blood and organs. As soon as the laboratory was reached agar plates were made from these inoculated bouillon tubes, the former as well as the latter being then incubated at from 35° to 37° C. In nearly every case gelatin plates were also made from the recently inoculated bouillon tubes and kept at a temperature of 19° to 20° C.

If colonies were found in the agar or gelatin plates, on the following days the corresponding bouillon tubes were also plated on agar and gelatin. The bacteria thus found in our plates were carefully isolated and studied upon the usual nutritive media, so as to enable us to identify them, if possible. We will here content ourselves with giving the results as regards the presence of *Bacillus icteroides* only:

TABLE II.

No. of case.	Day of disease.	Time of autopsy (hours after death).	Source of culture.	Bacillus icteroides.
1	Seventh	2	Blood, liver, spleen, kidney	Negative.
2	Sixth	13	do	Do.
3	Fourth	8	do	Do.
4	Eighth	2	Abdominal cavity, blood, liver, spleen, kidney, bile, duodenum.	Do.
5	Fourth	4	Blood, liver, spleen, kidney, bile, duodenum	Do
6	Sixth	$6\frac{1}{2}$	Abdominal cavity, blood, pericardial fluid, lung, spleen, kidney, liver, bile, duodenum.	Do.
7	do	$\frac{5}{6}$	Blood, lung, liver, spleen, kidney, bile, jejunum	Do.
8	do	$\frac{1}{2}$	Blood, lung, liver, spleen, kidney, urine, small intestine	Do.
9	Fourth	2	Liver, spleen, small intestine	Do.
10	Fifth	7	Liver, kidney, spleen, small intestine	Do.
11	Third	$\frac{1}{2}$	Liver, kidney, spleen	Do.

Our failure to isolate *Bacillus icteroides* in these 11 autopsies of yellow fever patients was a result which we had not anticipated. One of us (Agramonte), who at Santiago, Cuba, during the epidemic of 1898, succeeded in finding *Bacillus icteroides* in 33 per cent of his autopsies, has been much surprised at the absence of this bacillus in cultures from cadavers sectioned in or near Habana during the present year. In 2 of the 11 cases we had reason to believe that from the appearance of colonies seen in gelatin plates we would be able to isolate *Bacillus icteroides*. These colonies, however, when transferred to other media and carefully studied, did not prove to be this bacillus. We wonder whether other observers have occasionally relied upon the appearance of colonies in gelatin plates without further study. We only mention this as a possible explanation of the large percentage of positive results recorded by some observers.

Portier, of New Orleans, La., only succeeded, however, in isolating *Bacillus icteroides* in 3 out of 51 autopsies. (Journal of American Medical Association, April 16, 1898.)

Lutz (Revista d'Igiene e Sanita Publica, xi, No. 13, July, 1900, pp. 474–475) says as the result of his extensive observations on yellow fever that *Bacillus icteroides* can not be found by present laboratory methods in more than half of the cases of yellow fever, and that when present the colonies are few in number. It is possible that our future autopsies may give more favorable results as regards *Bacillus icteroides*.

The mosquito as the host of the parasite of yellow fever.—Having failed to isolate *Bacillus icteroides*, either from the blood during life or from the blood and organs of cadavers, two courses of procedure in our further investigations appeared to be deserving of attention, viz, first, a careful study of the intestinal flora in yellow fever in comparison with the bacteria that we might isolate from the intestinal canal of healthy individuals in this vicinity, or those sick with other diseases; or, secondly, to give our attention to the theory of the propagation of yellow fever by means of the mosquito—a theory first advanced and ingeniously discussed by Dr. Carlos J. Finlay, of Habana, in 1881. (Anales de la Real Academia, vol. xviii, 1881, pp. 147–169.)

We were influenced to take up the second line of investigation by reason of the well-known facts connected with the epidemiology of this disease, and, of course, by the brilliant work of Ross and the Italian observers in connection with the theory of the propagation of malaria by the mosquito.

We were also very much impressed by the valuable observations made at Orwood and Taylor, Miss., during the year 1898, by Surgeon Henry R. Carter, United States Marine-Hospital Service. (A note on the interval between infecting and secondary cases of yellow fever, etc., reprint from New Orleans Medical Journal, May, 1900.) We do not believe that sufficient importance has been accorded these painstaking and valuable data. We observe that the members of the yellow fever commission of the Liverpool School of Tropical Medicine, Drs. Durham and Meyers, to whom we had the pleasure of submitting Carter's observations, have been equally impressed by their importance. (British Medical Journal, September 8, 1900, pp. 656–657.)

The circumstances under which Carter worked were favorable for recording with considerable accuracy the interval between the time of arrival of infected cases in isolated farm houses and the occurrence of secondary cases in these houses. According to Carter, "the period from the first (infecting) case to the first group of cases infected at these houses is generally from two to three weeks."

The houses having now become infected, susceptible individuals thereafter visiting the houses for a few hours fall sick with the disease in the usual period of incubation, one to seven days.

Other observations made by us since our arrival confirmed Carter's conclusions, thus pointing, as it seemed to us, to the presence of an intermediate host, such as the mosquito, which having taken the parasite into its stomach soon after the entrance of the patient into the non-infected house, was able after a certain interval to reconvey the infecting agent to other individuals, thereby converting a non-infected house into an "infected" house. This interval would appear to be from nine to sixteen days (allowing for the period of incubation), which agrees fairly closely with the time required for the passage of the malarial parasite from the stomach of the mosquito to its salivary glands.

In view of the foregoing observations, we concluded to test the theory of Finlay on human beings. According to this author's observation of numerous inoculations in 90 individuals, the applications of one or two contaminated mosquitoes is not dangerous, but followed in about 18 per cent by an attack of what he considers to be very benign yellow fever at most.

We here desire to express our sincere thanks to Dr. Finlay, who accorded us a most courteous interview and has gladly placed at our disposal his several publications relating to yellow fever during the past nineteen years, and also for ova of the variety of mosquito with which he had made his several inoculations. An important observation to be here recorded is that, according to Finlay's statement, thirty days prior to our visit these ova had been deposited by a female just at the edge of the water in a small basin, whose contents had been allowed to slightly evaporate, so that these ova were at the time of our visit entirely above contact with the water. Notwithstanding this long interval after deposition they were promptly converted into the larval stage after a short period by raising the water in the basin.

With the mosquitoes thus obtained we have been able to conduct our experiments. Specimens of this mosquito forwarded to Mr. L. O. Howard, entomologist, Department of Agriculture, Washington, D. C., were kindly identified as *Culex fasciatus*, Fabr.

In this preliminary note we have not space to refer at length to the various interesting contributions made by Finlay to the mosquito theory for the propagation of yellow fever. In addition to the paper already quoted, his most important contributions to this theory are to be found in the articles designated as follows: Estadistica de las Inoculaciones con mosquitos contaminados, etc., reprint, Habana, 1891; Fiebre Amarilla, Estudio Clinico Patologico y Etiologico, reprint, Habana, 1895; and Yellow Fever Immunity—Modes of Propagation—Mosquito Theory, Eighth Congress of International Hygiene and Demography, Budapest, 1894.

His present views on this subject may be stated in his own language:

"First, reproduction of the disease, in a mild form, within five to twenty-five days after having applied contaminated mosquitoes to susceptible subjects. Second, partial or complete immunity against yellow fever obtained even when no pathogenous manifestation had followed these inoculations." (Medical Record, vol. 55, No. 21, May 27, 1899.)

Without reviewing the cases regarded as mild forms by the author of this theory, we believe that he has not as yet succeeded in reproducing a well-marked attack of yellow fever, attended with albumin and jaundice, within the period of incubation of the disease, and in which all other sources of infection could be excluded.

The experiments made by us on 11 non-immune individuals are embraced in Table III, which should be carefully studied. The mosquito used in all cases was *Culex fasciatus*, Fabr.

TABLE III.—*Inoculation on non-immune individuals through the bite of mosquitoes (Culex fasciatus.)*

No. of case.	Age.	Nativity.	Date of inoculation.	Character of attack.	Number of patients bitten.	Day of disease.	Time between infection of mosquito and inoculation.	Number of mosquitoes.	Result.
							Days.		
1	......	U.S	Aug. 11	Mild	1	7th	5	1	Negative.
2	......	U.S	do	Very mild	1	5th	5	1	Do.
3	24	U.S	Aug. 12	do	1	5th	6	1	Do.
4	20	U.S	do	do	1	5th	6	1	Do.
5	24	U.S	Aug. 14	do	1	5th	8	1	Do.
6	34	U.S	Aug. 16	do	1	5th	10	1	Do.
7	22	U.S	Aug. 18	Severe	1	2d	3	1	Do.
8	20	U.S	Aug. 19	Very mild	1	5th	13	2	Do.
				Severe	1	1st	3		
9	28	U.S	Aug. 25	Fatal	1	2d	6	1	Do.
				Mild	1	1st	4		
				Severe	1	2d	2		
10	46	Eng	Aug. 27	do	1	2d	12	1	Positive.[1]
				Mild	1	1st	6		
				Severe	1	2d	4		
				Mild	1	2d	2		
11	24	U.S	Aug. 31	Fatal	1	2d	12	1	Positive.[2]
				Mild	2	2d	4, 10		
				Severe	2	2d, 9th	2, 8		
				do	3	1st, 2d, 2d	2, 8, 16	1	
				Mild	2	1st, 2d	6, 10		
				Fatal	1	2d	12	1	
				Severe	1	1st	2		
				Mild	3	1st, 2d, 2d	4, 6, 10		
				Severe	3	All on 1st.	2, 4, 8	1	
				Mild	1	2d	6		

[1] Severe attack of yellow fever.

[2] Well-marked attack of yellow fever.

It will be seen that we record 9 negative and 2 positive results. It is, we think, important to observe that of the 9 failures to infect, the time elapsing between the biting of the mosquito and the inoculation of the healthy subject varied in 7 cases from two to eight days (Nos. 1, 2, 3, 4, 5, 7, and 9), and in the remaining 2 from ten to thirteen days (Nos. 6 and 8).

Five individuals out of the nine who failed to show any result (Nos. 2, 3, 4, 5, and 6) were inoculated by mosquitoes that had bitten very mild cases of yellow fever on the fifth day of the disease, and one individual by a mosquito that had bitten a mild case of yellow fever on the seventh day of the disease. (This latter patient was discharged from the hospital three days later.) To this fact may possibly be attributed the negative results. Of the remaining 3 negative cases (Nos. 7, 8, and 9), and which had been inoculated by mosquitoes that had bitten severe cases of the disease, the interval between the bite and the inoculation varied from two to six days.

In the 2 cases (Nos. 6 and 8) where the interval was respectively ten and thirteen days, the inoculations had been made with mosquitoes that had bitten very mild cases of yellow fever on the fifth day of the attack. No. 8 was also bitten by a mosquito which had been infected by a severe case of yellow fever three days before.

We refrain from commenting further at this time upon the 9 negative cases, preferring to record the results thus obtained rather than to indulge in speculation.

Of the two cases which we have recorded as positive in Table III, we now propose to speak at greater length.

CASE 10.

Dr. James Carroll, acting assistant surgeon, United States Army, a member of this board, was bitten at 2 p. m. August 27, 1900, by *Culex fasciatus*. This particular mosquito had bitten a severe case of yellow fever on the second day of the disease twelve days before; a mild case of yellow fever on the first day of the attack six days preceding; a severe case of yellow fever on the second day of the attack four days before, and a mild case of yellow fever on the second day of attack two days before inoculation.

Dr. Carroll remained well until the afternoon of the 29th, when he states that he felt tired, and for this reason, when on a visit to Las Animas Hospital the same afternoon (29th) some time between 4 and 6 p. m., after visiting a few patients, he left the wards and waited outside on the porch, while his companions remained in the wards.

August 30.—During the afternoon, although not feeling well, Dr. Carroll visited La Playa, about 1½ miles from Columbia Barracks, and took a sea bath.

August 31.—Dr. Carroll realized that he was sick and that he had fever, although he refrained from taking his temperature, but did visit the laboratory, distant about 140 yards, for the purpose of examining his blood for the malarial parasite. The examination was negative. During the afternoon he was compelled to take to his bed. At 7 p. m. temperature was 102° F. He had no headache or backache; only a sense of great lassitude. His eyes were injected and his face suffused.

September 1.—At 7 a. m. his temperature was 102°. Blood was again carefully examined by Dr. Lazear with negative result. At 11 a. m. temperature was 102°.

The case having been diagnosed as yellow fever, Dr. Carroll was at noon removed to the yellow fever wards. At 9 p. m. temperature was 102.8°, pulse 90; at 12 o'clock midnight temperature 103.4°, pulse 84.

September 2.—At 3 a. m. temperature was 103.6°, pulse 80. A trace of albumin was now found in the urine. The subsequent history of the case was one of severe yellow fellow. Jaundice appeared on September 3.

The accompanying chart, No. 1, contains all the necessary data.

CASE 11.

X Y, aged 24, white, American, a resident of the military reservation of Columbia Barracks, was bitten during the forenoon of August 31, 1900, by the same mosquito that had bitten case 10 (Dr. Carroll) 4 days before, and which in the meantime had bitten a mild case of yellow fever (first day) 2 days before being applied to X Y.

X Y was also bitten by a second mosquito that had been applied to a fatal case of yellow fever (second day) 12 days before; and to two mild cases (second day) 4 and 10 days previously; also, by a third mosquito that had bitten a fatal case of yellow fever (second day) 12 days before; a severe case (first day) 2 days before, and three mild cases (first, second, and second day) 4, 6, and 10 days before; finally by a fourth mosquito that had bitten three severe cases of yellow fever (all on first day) 2, 4, and 8 days previously, and one mild case (second day) 6 days before. (Vide Table III.)

It will be seen that X Y was bitten by four mosquitoes, two of which had bitten severe (fatal) cases of yellow fever 12 days previously; one of which had bitten a severe case (second day) 16 days before; and one which had bitten a severe case 8 days before.

X Y began to experience a sense of dizziness and disinclination to work. This was just 5 days from the time of the mosquito inoculation; twenty-four hours later he was still dizzy and light headed in attempting to move about. During the afternoon (sixth day after inoculation) he had chilly sensations, followed by fever and restlessness during the night.

On the following day (seventh day after inoculation), 8 a. m., temperature 102.8° F., his eyes were slightly injected and his face suffused. The patient was removed to the yellow fever wards; at 9 a. m. temperature was 103° F., pulse, 66. A trace of albumin was found in the urine during the afternoon (third day of the attack). This increased during the following days. The conjunctivæ were slightly jaundiced on the fourth day of the disease, which was more distinct and could be plainly seen on the anterior aspect of the chest on the fifth and following days. Bleeding from the gums was noticed on the third and subsequent days after admission. Repeated examinations of the blood failed to show any malarial parasites.

The course of the fever, the appearance of albumin in the urine, with jaundice and hemorrhage of the gums, together with the slow pulse, all pointed distinctly to the diagnosis of yellow fever. His attending physician, Dr. Roger P. Ames, United States Army, an expert in the diagnosis and treatment of this disease, did not hesitate to diagnose X Y's attack as one of "well-pronounced yellow fever." Dr. Ames was not cognizant of the method of inoculation in this case. (Vide Chart II.)

We invite attention to the fact that from August 17 to October 13, a period of fifty-seven days, only three cases of yellow fever have occurred at Columbia Barracks among a population of 1,400 non-immune Americans, and we consider it very important to note that two of these had been bitten within five days of the commencement of their attacks by contaminated mosquitoes.

We will now briefly give the history of the third case of yellow fever that has occurred at Columbia Barracks during the period August 17 to October 13, 1900.

In the light of cases 10 and 11, we consider this case of sufficient importance to be here included, especially as it is one that might be possibly designated as a case of accidental infection by a mosquito.

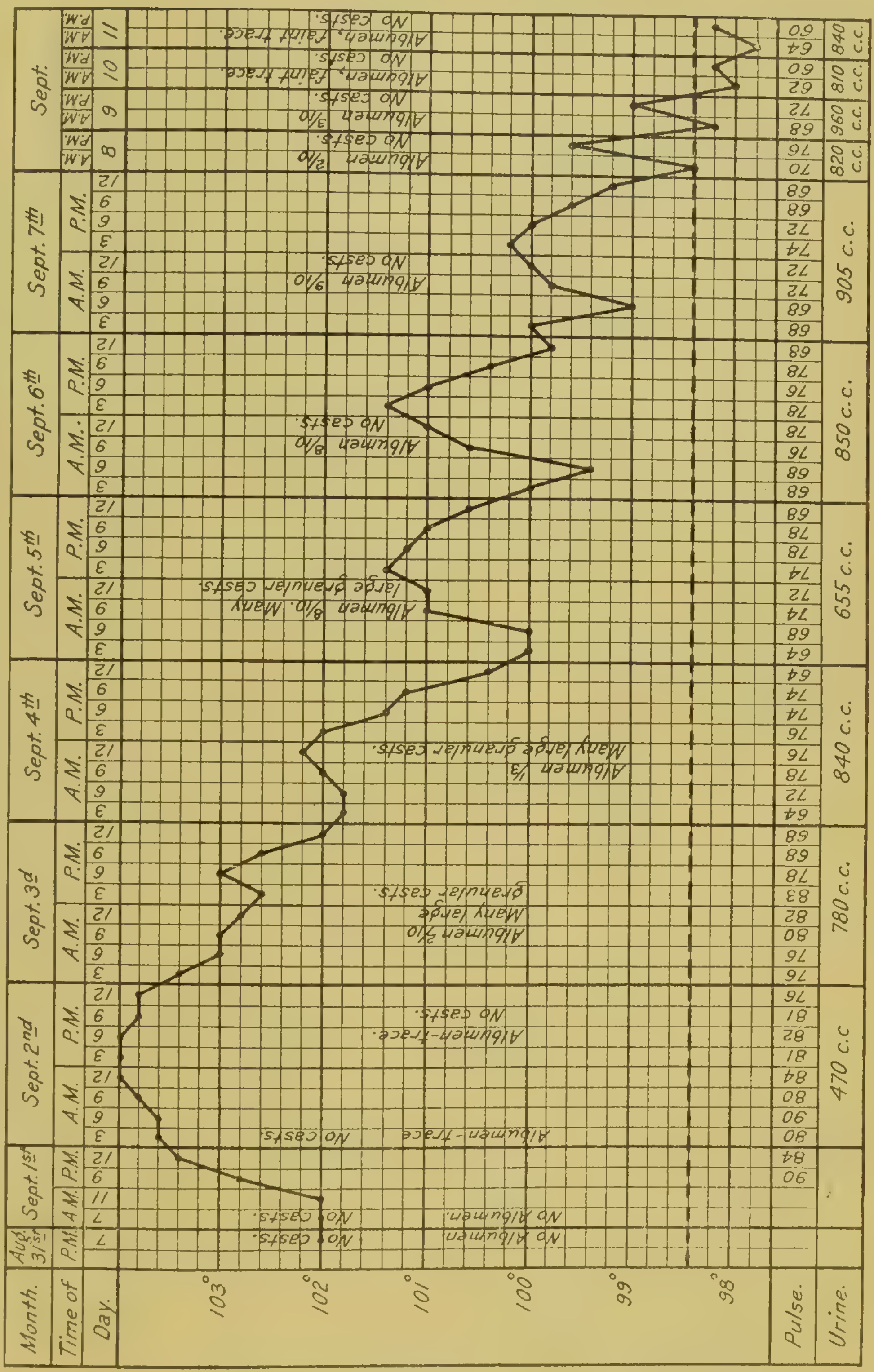
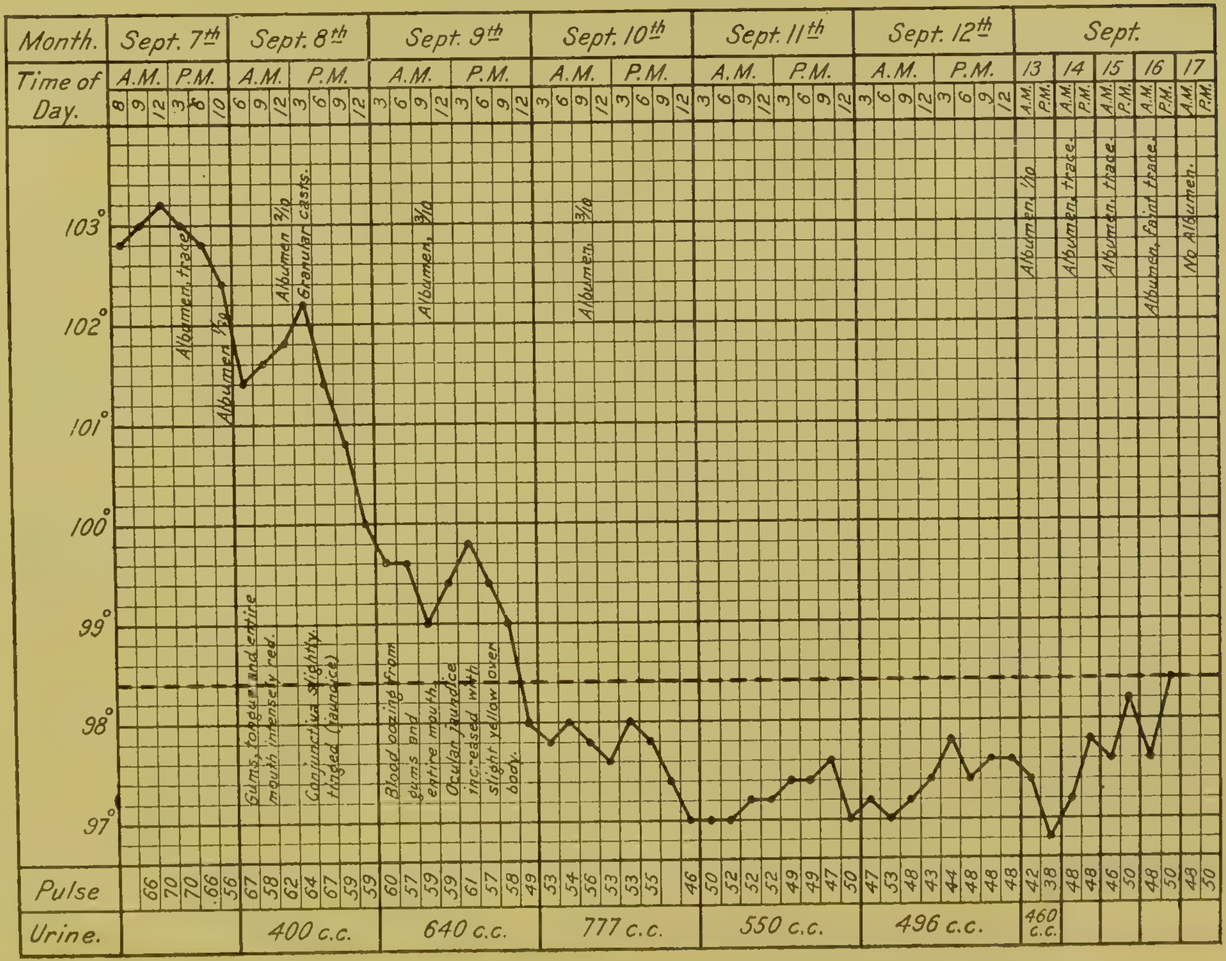


CHART I.—Yellow fever following, within the usual period of incubation, the bite of an infected mosquito (*Culex fasciatus*).

CHART II.—*Yellow fever following, within the usual period of incubation, the bite of an infected mosquito (Culex fasciatus).*



CASE 3.

Dr. Jesse W. Lazear, acting assistant surgeon, United States Army, a member of this board, was bitten on August 16, 1900 (case 3, Table III), by a mosquito (*Culex fasciatus*), which ten days previously had been contaminated by biting a very mild case of yellow fever (fifth day). No appreciable disturbance of health followed this inoculation.

On September 13, 1900 (forenoon), Dr. Lazear, while on a visit to Las Animas Hospital, and while collecting blood from yellow fever patients for study, was bitten by a *Culex* mosquito (species undetermined). As Dr. Lazear had been previously bitten by a contaminated insect without effect, he deliberately allowed this particular mosquito, which had settled on the back of his hand, to remain until it had satisfied its hunger.

On the evening of September 18, five days after the bite, Dr. Lazear complained of feeling "out of sorts," and had a chill at 8 p. m.

On September 19, 12 o'clock noon, his temperature was 102.4°, pulse 112; his eyes were injected and his face suffused. At 3 p. m. temperature was 103.4°, pulse 104; 6 p. m., temperature 103.8°, and pulse 106; albumin appeared in the urine. Jaundice appeared on the third day. The subsequent history of this case was one of progressive and fatal yellow fever, the death of our much-lamented colleague having occurred on the evening of September 25, 1900.

As Dr. Lazear was bitten by a mosquito while present in the wards of the yellow-fever hospital, one must at least admit the possibility of this insect's contamination by a previous bite of a yellow-fever patient. This case of accidental infection can not fail to be of interest in connection with cases 10 and 11.

For ourselves, we have been profoundly impressed with the mode of infection and with the results that followed the bite of the mosquito in these three cases. Our results would appear to throw new light on Carter's observations in Mississippi as to the period required between the introduction of the first (infecting) case and the occurrence of secondary cases of yellow fever.

Since we here, for the first time, record a case in which a typical attack of yellow fever has followed the bite of an infected mosquito, within the usual period of incubation of the disease, and in which other sources of infection can be excluded, we feel confident that the publication of these observations must excite renewed interest in the mosquito theory of the propagation of yellow fever as first proposed by Finlay.

From our study thus far of yellow fever, we draw the following conclusions:

1. *Bacillus icteroides* (Sanarelli) stands in no causative relation to yellow fever, but, when present, should be considered as a secondary invader in this disease.
2. The mosquito serves as the intermediate host for the parasite of yellow fever.

The second report submitted by the board on the etiology of yellow fever was, with my approval, read at the Pan-American Medical Congress held in Habana, Cuba, February 4–7, 1901.

THE ETIOLOGY OF YELLOW FEVER, BY MAJ. WALTER REED, SURGEON, UNITED STATES ARMY, JAMES CARROLL, AND ARISTIDES AGRAMONTE, ACTING ASSISTANT SURGEONS, UNITED STATES ARMY.

Since the publication of our preliminary note we have continued our investigations, especially as regards the means by which yellow fever is propagated from individual to individual, and as to the manner in which houses become infected with the contagium of this disease. The results already obtained are so positive and striking that, with the permission of Surgeon-General Sternberg, we have concluded to present to this Congress an additional note, in which we will record these later observations. We desire to here express our sincere thanks to the military governor of the island of Cuba, Maj. Gen. Leonard Wood, United States Volunteers, without whose approval and assistance these observations could not have been carried out.

In order to exercise perfect control over the movements of those individuals who were to be subjected to experimentation and to avoid any other possible source of infection, a location was selected in an open and uncultivated field, about 1 mile from the town of Quemados, Cuba. Here an experimental sanitary station was established under the complete control of the senior member of this board. This station was named Camp Lazear, in honor of our late colleague, Dr. Jesse W. Lazear, acting assistant surgeon, United States Army, who died of yellow fever while courageously investigating the causation of this disease. The site selected was well drained, freely exposed to sunlight and winds, and from every point of view satisfactory for the purposes intended.

The personnel of this camp consisted of 2 medical officers, Dr. Roger P. Ames, acting assistant surgeon, United States Army, an immune, in immediate charge; Dr. R. P. Cooke, acting assistant surgeon, United States Army, non-immune; 1 acting hospital steward, an immune; 9 privates of the hospital corps, 1 of whom was immune, and 1 immune ambulance driver.

For the quartering of this detachment and of such non-immune individuals as should be received for experimentation, hospital tents, properly floored, were provided. These were placed at a distance of about 20 feet from each other, and were numbered 1 to 7, respectively.

Camp Lazear was established November 20, 1900, and from this date was strictly quarantined, no one being permitted to leave or enter camp except the 3 immune members of the detachment and the members of the board. Supplies were drawn chiefly from Columbia Barracks, and for this purpose a conveyance under the control of an immune acting hospital steward and having an immune driver was used.

A few Spanish immigrants recently arrived at the port of Habana, were received at Camp Lazear from time to time, while these observations were being carried out. A non-immune person, having once left this camp, was not permitted to return to it under any circumstances whatever.

The temperature and pulse of all non-immune residents were carefully recorded three times a day. Under these circumstances any infected individual entering the camp could be promptly detected and removed. As a matter of fact only two persons, not the subject of experimentation, developed any rise of temperature; one, a Spanish immigrant, with probable commencing pulmonary tuberculosis, who was discharged at the end of three days, and the other, a Spanish immigrant, who developed a temperature of 102.6° F. on the afternoon of his fourth day in camp. He was at once removed with his entire bedding and baggage and placed in the receiving ward at Columbia Barracks. His fever, which was marked by daily intermissions for three days, subsided upon the administration of cathartics and enemata. His attack was considered to be due to intestinal irritation. He was not permitted, however, to return to the camp.

No non-immune resident was subjected to inoculation who had not passed in this camp the full period of incubation of yellow fever, with one exception, to be hereinafter mentioned.

I. Having thus sufficiently indicated the environment of Camp Lazear and the conditions under which its residents lived, we will now proceed to a narration of the observations thus far made at this experimental station. At the time these inoculations were begun the several tents were occupied as follows: Tent No. 1 by 1 immune and 1 non-immune; No. 2 by 1 immune and 2 non-immunes; No. 3 by 2 immunes; No. 4 by 3 non-immunes; No. 5 by 3 non-immunes; No. 6 by 2 non-immunes, and No. 7 by 1 non-immune.

For the purpose of experimentation subjects were selected as follows: From Tent No. 2, 2 non-immunes, and from Tent No. 3, 3 non-immunes. Later 1 non-immune in Tent No. 6 was also designated for inoculation.

Case 1.[1]—Private John R. Kissinger, Hospital Corps, United States Army, aged 23, a non-immune, occupant of Tent No. 2, with his full consent, was bitten at 10.30 a. m., November 20, 1900, by a mosquito (*C. fasciatus*) that had bitten a severe case of yellow fever on the fifth day, eleven days previously; another severe case, on the third day, six days before, and a third severe case on the third day, three days before. As Kissinger had not absented himself from Columbia Barracks for a period of more than thirty days, it was considered safe to inoculate him without waiting for his period of incubation to pass.

November 23, 1900, Kissinger was again bitten by the same mosquito. The result of both inoculations was negative. The mosquito, therefore, was incapable of conveying any infection on the eleventh or fourteenth day after it had bitten a severe case of yellow fever on the third day of the disease. This insect had been kept at ordinary room temperature and died November 26, 1900.

December 5, 1900, at 2 p. m., twelve days after the last inoculation, Kissinger was again bitten by five mosquitoes (*C. fasciatus*), two of which had bitten fatal cases of yellow fever on the second day, fifteen days before; one a severe case on the second day, nineteen days previously, and two a mild case on the third day, twenty-one days before.

The record of temperature and pulse, taken every three hours, following this inoc-

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[1] This was the first successful inoculation at Camp Lazear, and is therefore designated Case No. 1.

CAMP LAZEAR, THE EXPERIMENTAL SANITARY STATION NEAR QUEMADOS, CUBA.

"INFECTED BEDDING BUILDING" AND "MOSQUITO BUILDING," CAMP LAZEAR, NEAR QUEMADOS, CUBA

ulation, showed that the subject remained in his usual state of health during the following three days, except that on December 8, on the third day, Kissinger had slight vertigo, upon rising, which soon passed away. At 4.30 p. m.—commencement of fourth day—he complained of frontal headache; otherwise he felt well and partook of supper with appetite; at 9 p. m., temperature 98.4° F., pulse 90; at 11.30 p. m., he awoke with a chill, temperature 100° F., pulse 90; he complained of severe frontal headache and backache; his eyes were injected and his face suffused. December 9, at 3 a. m., his temperature was 102° F., pulse 102; he had violent headache and backache with nausea and vomiting. He was then removed to the yellow-fever wards. His subsequent history was that of a case of yellow fever of moderate severity. Albumin appeared in the urine on the fourth day, increased to one-fifth by volume on the sixth day and disappeared on December 22. Granular casts were present in considerable numbers from the fourth to the eighth day. The conjunctivæ were jaundiced on the third day. The diagnosis of yellow fever in this case was made by Drs. Juan Guitéras, Carlos Finlay, W. C. Gorgas, and A. Diaz Albertini, the board of yellow fever experts of the city of Habana, who saw the patient on several occasions during his illness. (See Chart III.) The period of incubation in this case was 3 days 9½ hours.

Case 2.—John J. Moran, aged 24, an American, non-immune occupant of Tent No. 2, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) which twelve days before had bitten a case of yellow fever of moderate severity, on the third day of the disease. This insect had also bitten a well-marked case of fellow fever (second day) ten days previously.

November 29, at 2.20 p. m., Moran was again bitten by the same mosquito. The result of both of these inoculations was negative. This insect was, therefore, incapable of conveying the infection fifteen days after having bitten a case of yellow fever of moderate severity on the third day, and thirteen days after it had bitten a well-marked case of this disease on the second day. This mosquito had been kept at room temperature. Moran's case will be again referred to when we come to speak of the infection of a building by means of contaminated mosquitoes.

Case 3.—A Spanish immigrant, aged 26, a non-immune occupant of tent No. 5, with his full consent, was bitten at 4 p. m., December 8, 1900, by four mosquitoes (*C. fasciatus*) which had been contaminated as follows: One by biting a fatal case of yellow fever, on the third day, seventeen days before; one a severe one, on the third day, eighteen days before; one a severe case, on the second day, twenty-two days before, and one a case of moderate severity, on the third day, twenty-four days previously.

The record of temperature and pulse, taken every three hours after the inoculation, shows no rise of temperature above 99 F. until 6 p. m., December 13 (sixth day), when 99.4° F. is recorded; pulse 68. The subject, who was of a very lively disposition, retained his usual spirits until noon of the 13th, although he complained of a slight frontal headache on the 11th and 12th. He took to his bed at noon of the 13th (fifth day), complaining of increased frontal headache and a sense of fatigue. At 9 p. m. his temperature was 98.2° F., pulse 62.

December 14, at 6 a. m., temperature was 98° F., pulse 72, and he still complained of frontal headache and general malaise. Profuse epistaxis occurred at 7.45 a. m.; at 9 a. m., temperature 99.6° F., pulse 80; 1.15 p. m., temperature 100° F., pulse 80; he complained of a sense of chilliness, with frontal headache increased, and slight pain in the back, arms, and legs; 3 p. m., temperature 100° F., pulse 80; 4.15 p. m., temperature 100.7° F., pulse 68; his face was flushed and eyes congested. He was removed to the yellow-fever wards. A trace of albumin was found in the urine passed at 3.30 p. m., December 15; a few hyaline casts were also present. He was seen at this time by the Habana board of experts and the diagnosis of mild yellow fever confirmed. (See Chart No. IV.)

The period of incubation in this case was four days and twenty hours, counting from the time of inoculation to the hour when the patient took to his bed; if reckoned to the onset of fever, it was five days and seventeen hours.

Case 4.—A Spanish immigrant, aged 27, a non-immune occupant of tent No. 5, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) which had bitten a severe case of yellow fever on the second day, ten days before. Three days later, November 29, he was again bitten by the same insect. December 2, after an interval of three days, he was again bitten by the same insect, and also by a second mosquito (*C. fasciatus*) which, twelve days before, had been contaminated by biting a fatal case of yellow fever on the third day. No unfavorable effects followed any of these attempted inoculations. The first-mentioned mosquito, therefore, was incapable of conveying any infection on the seventeenth day, after biting a severe case of yellow fever on the second day; the other also failed to infect on the

CHART III.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 9½ hours.]

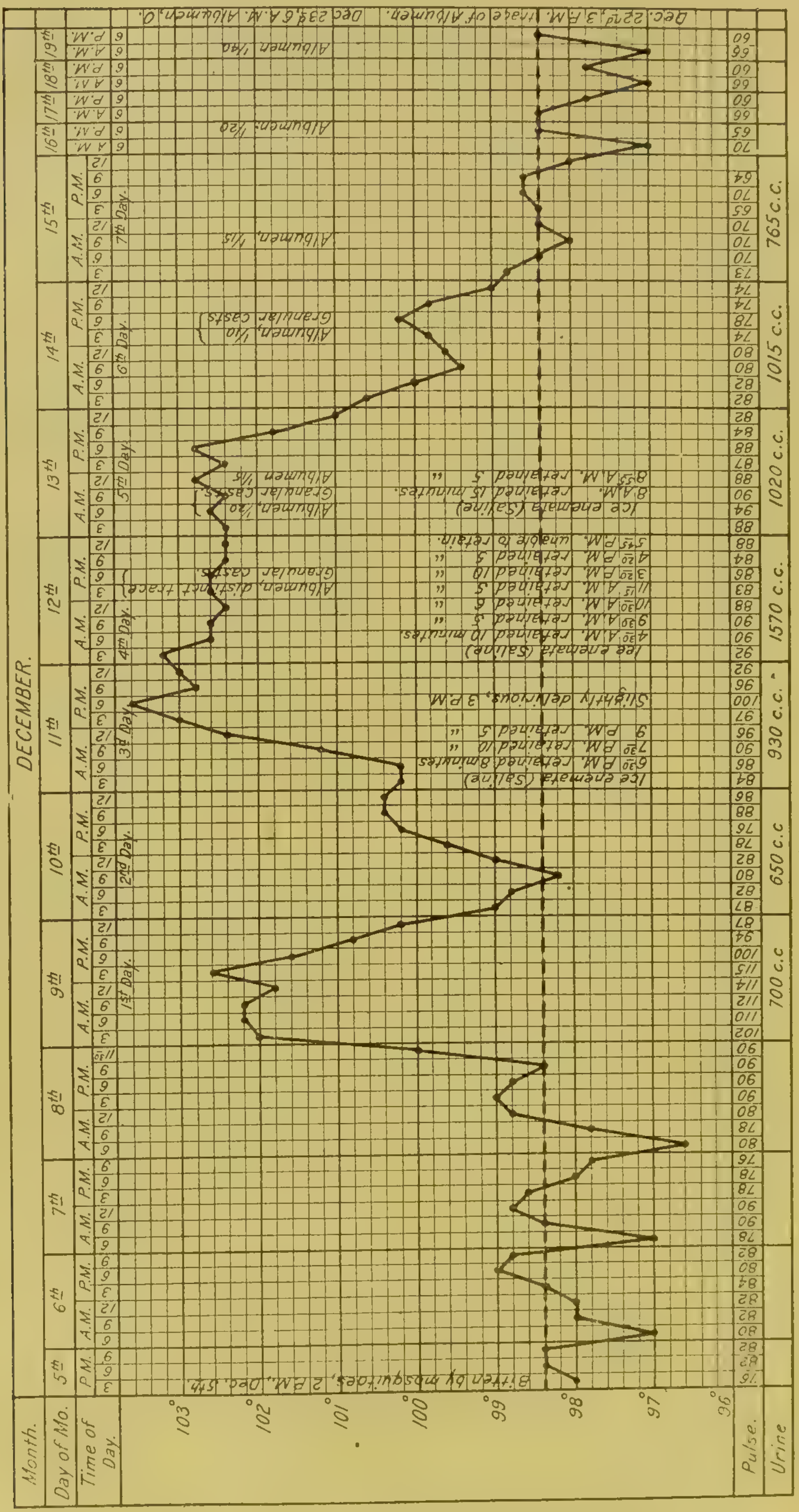
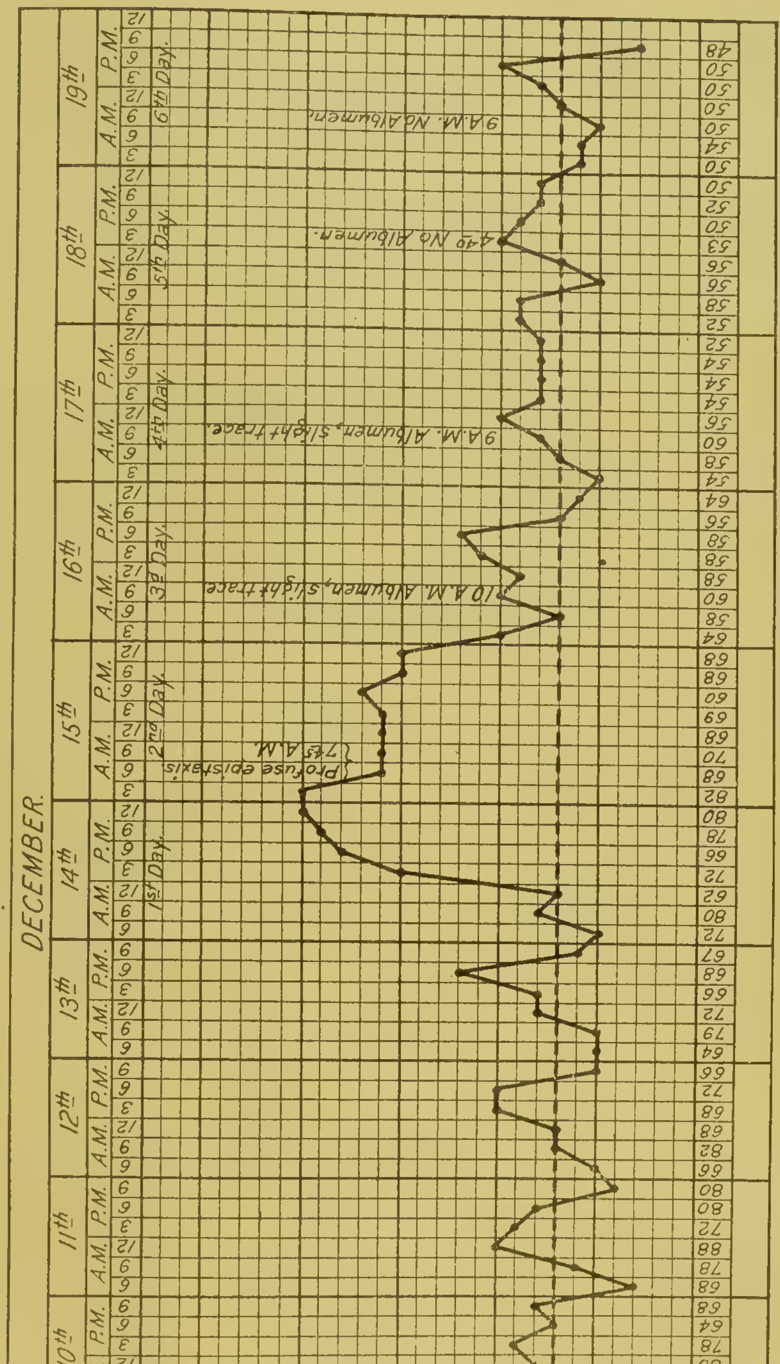


CHART IV.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 4 days 20 hours.]



twelfth day, after biting a fatal case of yellow fever on the third day. Both of these mosquitoes had been kept at ordinary room temperature.

December 9, after an interval of seven days, the subject was again bitten, at 10.30 a. m., by one mosquito (*C. fasciatus*) which had been infected nineteen days before by biting a fatal case of yellow fever on the second day of the disease. He remained in his usual health until 9 a. m., December 12 (third day), when he complained of frontal headache; his temperature was 98.8° F.; pulse 96. This headache continued during the entire day. At 6 p. m. temperature was 99° F., pulse 94; 9 p. m., temperature 99° F., pulse 84; 9.30 p. m., temperature 99.4° F., pulse 82. Severe headache and backache was complained of; his eyes were injected and his face suffused. The following morning he was sent to the yellow-fever wards. Urine passed at 4.20 p. m., December 15, the third day, gave a distinct trace of albumin. Many hyaline casts were present on the same date. The conjunctivæ were jaundiced on the third day.

The patient was seen by the board of experts on December 14, and the diagnosis of yellow fever made. (See Chart No. V.)

The period of incubation in this case was three days and eleven and one-half hours.

Case 5.—A Spanish immigrant, aged 26, a non-immune occupant of tent No. 5, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) that had bitten a well-marked case of yellow fever on the third day, twelve days before. November 29 he was again bitten by the same insect. December 2 he was for the third time bitten by two mosquitoes (*C. fasciatus*), both of which had bitten a well-marked case of yellow fever on the third day, eighteen days before. As no bad results followed any of these inoculations, it follows that these mosquitoes were incapable of conveying any infection eighteen days after they had bitten a well-marked case of yellow fever on the third day. Both of these insects had been kept at room temperature.

December 11, after an interval of nine days, the subject was again, at 4.30 p. m., bitten by the same mosquitoes, four in number, that had been applied to case 3, three days prior to this time, with positive results.

The record of temperature and pulse, taken every three hours following the inoculation, showed no change till December 13 (second day), at 9 a. m., when the temperature was 99° F., and the pulse 78. From this hour till 6 p. m. the temperature varied from 99.2° to 99.6° F. The subject complained of frontal headache, slight in degree, during the entire day. At 9 p. m. his temperature was 98.4° F., pulse 62.

December 14 (third day), he complained of slight frontal headache during the entire day, and was indisposed to exertion. From 6 a. m. to 6 p. m. the temperature averaged 99.2° F., and the pulse varied from 64 to 90; at 9 p. m. it was 98.4° F., pulse 78. December 15 (fourth day), at 6 a. m., temperature was 98.2° F., pulse 78. He still had frontal headache. At 9 a. m. temperature was 99.2° F, pulse 80; at 12 noon the former was 99.2° F., pulse 74. The subject now went to bed, complaining of headache and pains throughout the body. At 2 p. m. the temperature was 100° F., pulse 80; eyes much congested; face flushed. At 6 p. m. his temperature had risen to 102° F., and the pulse to 90. He was then transferred to the yellow-fever wards. Albumin appeared in the urine at 7.30 a. m., December 17. Bleeding from the gums and roof of the mouth occurred on the sixth and seventh days of his illness.

This case was examined by board of experts on the 16th and 19th, and the diagnosis of yellow fever made.

Albumin disappeared on the sixth day, the temperature falling to normal on this date, and remaining near this point till December 23, the ninth day of sickness, when a relapse occurred, attended with bleeding from the gums on December 24 and 25, with the appearance of red blood cells and pus cells in the urine in moderate numbers. Fever subsided on December 26, and the urine became normal on December 29. (See Chart VI.)

The period of incubation in this case, if reckoned from the time of inoculation to the hour when the patient took to his bed, was three days and nineteen and one-half hours.

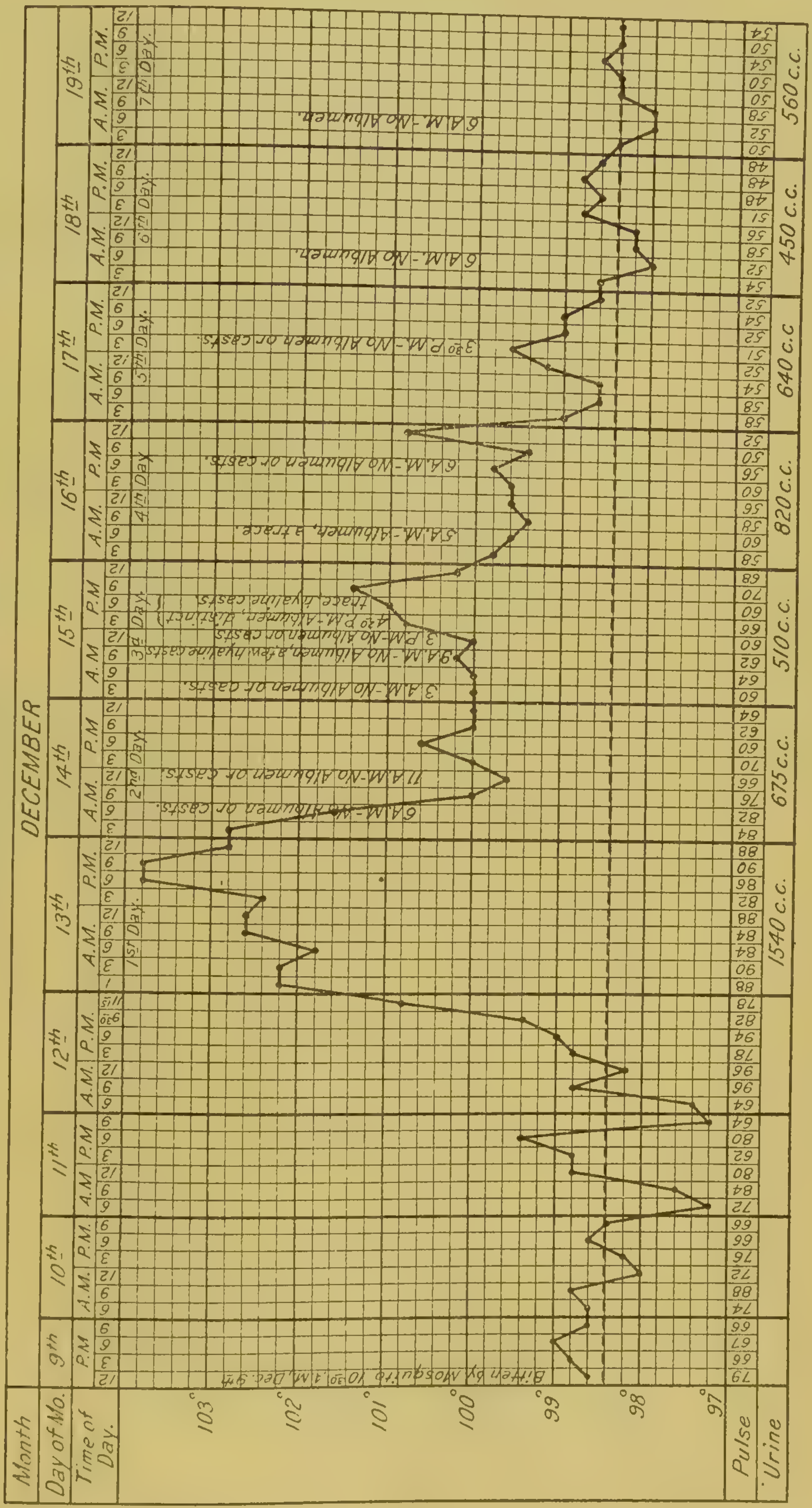
The four patients whose histories we have given above were also examined by a number of physicians of Habana, among whom we may mention Dr. Bango, of La Covadonga; Dr. Sanchez, of La Benéfica, and Dr. Moas, of La Purissima Concepcion, by all of whom the diagnosis of yellow fever was confirmed.

Let us now rapidly review the circumstances attending these cases of experimental yellow fever, in order to emphasize certain points of interest and importance in connection with their occurrence. (We omit any reference to the clinical histories.)

It should be borne in mind that at the time when these inoculations were begun there were only 12 non-immune residents at Camp Lazear, and that 5 of these were selected for experiment, viz, 2 in tent No. 2 and 3 in tent No. 5. Of these we suc-

CHART V.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 11 hours.]



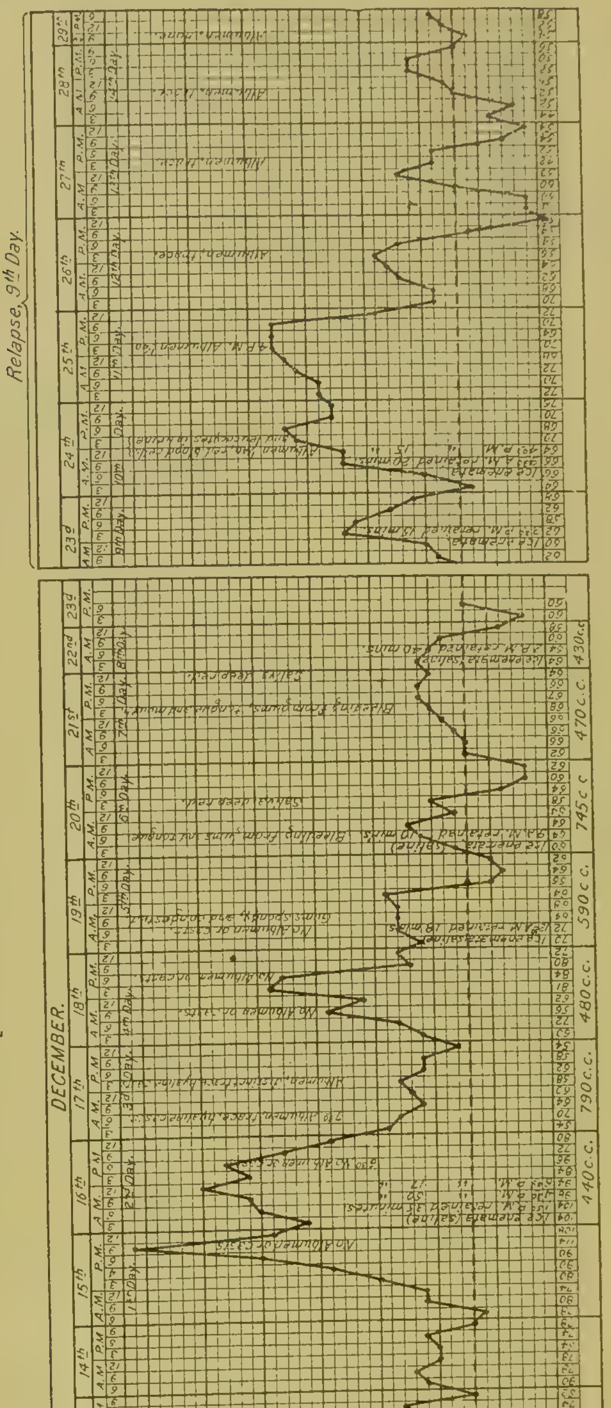


CHART VI.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 19½ hours.]

ceeded in infecting 4, viz, 1 in tent No. 2 and 3 in tent No. 5, each of whom developed an attack of yellow fever within the period of incubation of this disease. The one negative result, therefore, was in case 2—Moran—inoculated with a mosquito on the fifteenth day after the insect had bitten a case of yellow fever on the third day. Since this mosquito failed to infect case 4, three days after it had bitten Moran, it follows that the result could not have been otherwise than negative in the latter case. We now know, as the result of our observations, that in the case of an insect kept at room temperature during the cool weather of November, fifteen or even eighteen days would, in all probability, be too short a time to render it capable of producing the disease.

As bearing upon the source of infection, we invite attention to the period of time during which the subjects had been kept under rigid quarantine prior to successful inoculation, which was as follows: Case 1, fifteen days; case 3, nine days; case 4, nineteen days; case 5, twenty-one days. We further desire to emphasize the fact that this epidemic of yellow fever, which affected 33.33 per cent of the non-immune residents of Camp Lazear, did not concern the 7 non-immunes occupying tents Nos. 1, 4, 6, and 7, but was strictly limited to those individuals who had been bitten by contaminated mosquitoes.

Nothing could point more forcibly to the source of this infection than the order of the occurrence of events at this camp. The precision with which the infection of the individual followed the bite of the mosquito left nothing to be desired in order to fulfill the requirements of a scientific experiment.

The epidemic having ceased on December 15, 1900, no other case of yellow fever occurred in this camp until we again began to expose individuals to inoculation. Thus fifteen days later we made the following observation:

Case 6.—A Spanish immigrant, aged 27, a non-immune occupant of tent No. 6, with his full consent, was bitten at 11 a. m., December 30, 1900, by four mosquitoes (*C. fasciatus*) that had been contaminated seventeen days previously by biting a mild case of yellow fever on the first day of the disease (case 4). These insects had been kept at temperature of 82° F.

The subject remained in his normal condition until the evening of January 2, 1901, the third day, when he complained of frontal headache. At 6 p. m. his temperature was 99° F.; pulse, 64. He slept well, but still complained of headache on the following morning, January 3. He partook sparingly of breakfast and afterward lay on his bed, being disinclined to exert himself. At 9 a. m. the temperature was 99° F., pulse 96; 10.30 a. m., temperature 100° F., pulse 80. A sense of chilliness and sharp frontal headache were complained of. At 3 p. m. his temperature was 100.8° F., pulse 80; his eyes were congested and face flushed. He was removed to the yellow fever wards. A specimen of urine passed at midnight, January 4, contained a distinct trace of albumin. Slight bleeding from the gums occurred on the fifth and sixth days. The patient was seen by the board of experts on the second and seventh days of his attack, and the diagnosis of yellow fever confirmed. (See Chart VII.)

The period of incubation in this case was three days, twenty-two and one-half hours. The subject had remained in strict quarantine for twenty-two days preceeding his inoculation.

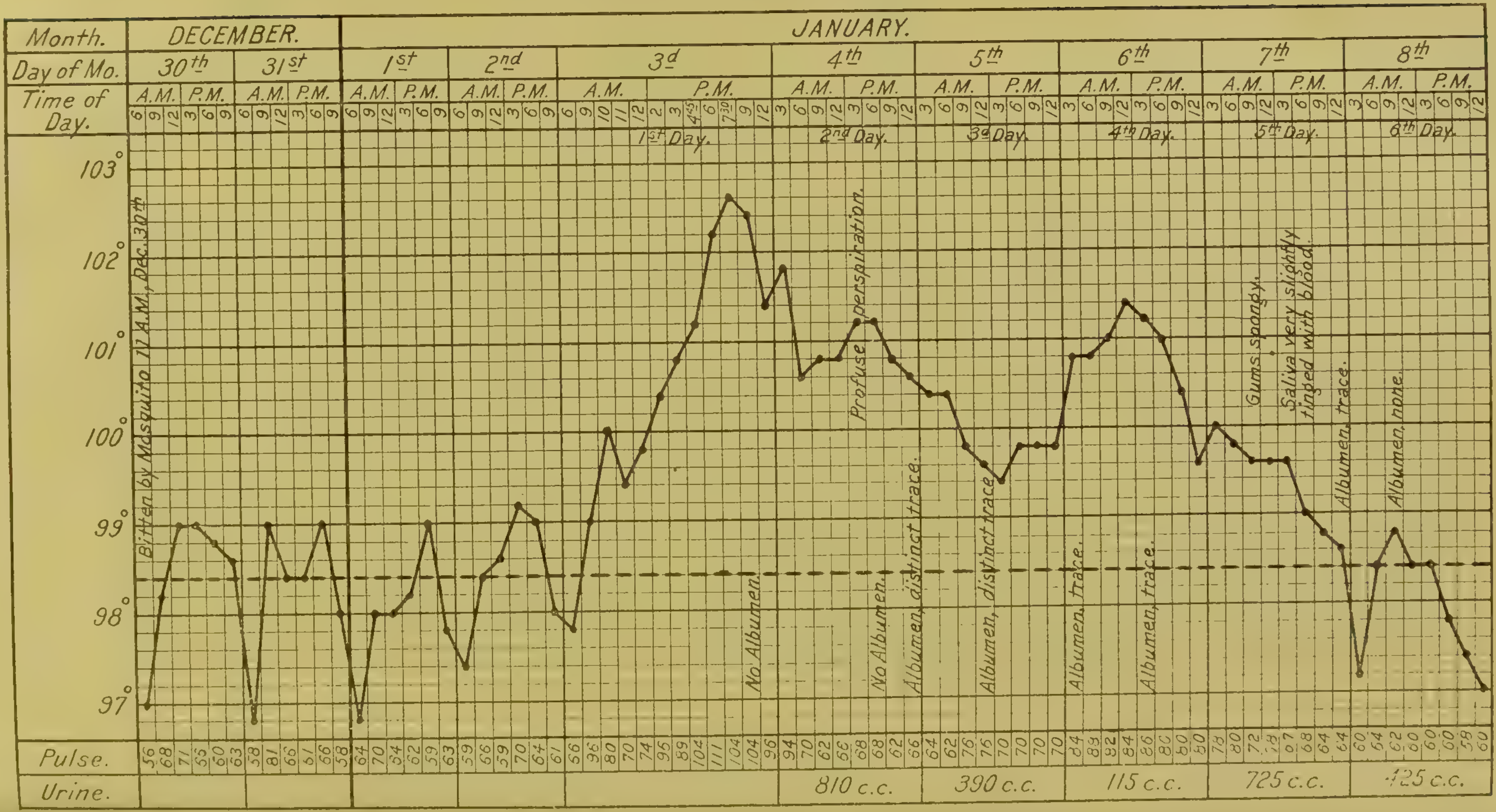
In considering the character of the attacks and the course of the disease in these five cases of experimental yellow fever, it must be borne in mind that these infected individuals were all young men, in good general physical condition and placed amid excellent hygienic surroundings. Further, it must not be forgotten that, upon the earliest manifestation of an approaching infection, they were each and all put to bed at once, and were even carried to the yellow fever wards while occupying the same bed. In other words, these men were kept at absolute rest from the first inception of the disease. Just what bearing this may have had on the subsequent course of the fever, we can not say, but since so much stress is laid on absolute rest of the patient by those having most experience in the treatment of yellow fever, the influence of this enforced rest, in our cases, upon the subsequent course of the attack, was doubtless of much importance. We reserve a consideration of the clinical side of these cases for a future report.

In our opinion the experiments above described conclusively demonstrate that an attack of yellow fever may be readily induced in the healthy subject by the bite of mosquitoes (*C. fasciatus*) which have been previously contaminated by being fed with the blood of those sick with yellow fever, provided the insects are kept for a sufficient length of time after contamination before being applied to the person to be infected.

Our observations do not confirm Finlay's statement that the bite of the mosquito may confer an abortive attack of yellow fever, when applied to the healthy subject two to six days after it has bitten a yellow fever patient. We have always failed to

CHART VII.—*Yellow fever, produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 22 hours.]



induce an attack, even of the mildest description, when we have used mosquitoes within less than twelve days from the time of contamination, although the insects were constantly kept at summer temperature. We could cite instances where we have applied mosquitoes at intervals of two, three, four, five, six, nine, and eleven days following the contamination of the insect with the blood of well-marked cases of yellow fever, early in the disease, without any effect whatever being produced by the bite. Thus in one case no result followed the bite of 14 mosquitoes which four days previously had been contaminated by biting a case of yellow fever on the first day. Again, seven days later, or eleven days after contamination, the surviving seven of these insects failed to infect an individual. On the seventeenth day after contamination, however, the bite of four of these mosquitoes—all that remained of the original fourteen—was promptly followed by an attack of yellow fever in the same individual. These insects had been kept, during the whole of this time, at an average temperature of 82° F.

Our observations would seem to indicate that after the parasite has been taken into the mosquito's stomach, a certain number of days must elapse before the insect is capable of reconveying it to man. This period doubtless represents the time required for the parasite to pass from the insect's stomach to its salivary glands, and would appear to be about twelve days in summer weather, and most probably about eighteen or more days during the cooler winter months. It follows also that our observations do not confirm Finlay's opinion that the bite of the contaminated mosquito without producing the disease may confer immunity against a subsequent attack of yellow fever. In our experience, an individual may be bitten on three or more occasions by contaminated mosquitoes without manifesting any symptoms of disturbance to health, and yet promptly sicken with yellow fever within a few days after being bitten by an insect capable of conveying the infection.

II. Having shown that yellow fever can be conveyed by the bite of an infected mosquito, it remains to inquire whether this disease can be acquired in any other manner. It has seemed to us that yellow fever, like the several types of malarial fever, might be induced by the injection of blood taken from the general circulation of a patient suffering with this disease. Accordingly we have subjected four individuals to this method of infection, with one negative and three positive results. Reserving the detailed description of these cases to a subsequent occasion, we may state that in one of the positive cases, an attack of pronounced yellow fever followed the subcutaneous injection of 2 cubic centimeters of blood taken from a vein at the bend of the elbow, on the first day of the disease, the period of incubation being three days and twenty-two hours; in the second case, 1.5 cubic centimeters of blood, taken on the first day of the disease, and injected in the same manner, brought about an attack within two days and twelve hours; while in our third case, the injection of 0.5 cubic centimeters of blood taken on the second day of the disease, produced an attack at the end of forty-one hours.

In the case mentioned as negative to the blood injection, the subsequent inoculation of this individual with mosquitoes already proved to be capable of conveying the disease, also resulted negatively. We think, therefore, that this particular individual, a Spanish immigrant, may be considered as one who probably possesses a natural immunity to yellow fever.

It is important to note that in the three cases in which the injection of the blood brought about an attack of yellow fever, careful cultures from the same blood, taken mmediately after injection, failed to show the presence of Sanarelli's bacillus.[1]

Our observations, therefore, show that the parasite of yellow fever is present in the general and capillary circulation, at least during the early stages of this disease, and hat the latter may be produced, like malarial fever, either by means of the bite of he mosquito, or by the injection of blood taken from the general circulation.

III. Can yellow fever be propagated in any other way?

We believe that the general consensus of opinion both of the medical profession and of the laity is strongly in favor of the conveyance of yellow fever by fomites.

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[1] A fourth case of yellow fever, severe in type, has been produced by the subcutaneous injection of cubic centimeter of blood taken from the general circulation on the second day of the disease, the eriod of incubation being three days and one hour. The patient, from whom the blood was obtained, as an experimental case, which was in turn produced by the injection of blood—0.5 cubic centimeters—derived from a non-experimental case of fatal yellow fever. As "controls," cases 1, 4, 6, nd 7 of this report were also injected subcutaneously with 1 cubic centimeter of the same blood ithout manifesting any symptoms whatever. The blood which produced this fourth case of yellow ver, when transferred at the same time to bouillon tubes in considerable quantities, gave no growth hatever.

The origin of epidemics, devastating in their course, has been frequently attributed to the unpacking of trunks and boxes that contained supposedly infected clothing; and hence the efforts of health authorities, both State and national, are being constantly directed to the thorough disinfection of all clothing and bedding shipped from ports where yellow fever prevails. To such extremes have efforts at disinfection been carried, in order to prevent the importation of this disease into the United States, that during the epidemic season all articles of personal apparel and bedding have been subjected to disinfection, sometimes both at the port of departure and at the port of arrival; and this has been done whether the articles have previously been contaminated by contact with yellow fever patients or not. The mere fact that the individual has resided, even for a day, in a city where yellow fever is present, has been sufficient cause to subject his baggage to rigid disinfection by the sanitary authorities.

To determine, therefore, whether clothing and bedding, which have been contaminated by contact with yellow fever patients and their discharges, can convey this disease is a matter of the utmost importance. Although the literature contains many references to the failure of such contaminated articles to cause the disease, we have considered it advisable to test, by actual experiment on non-immune human beings, the theory of the conveyance of yellow fever by fomites, since we know of no other way in which this question can ever be finally determined.

For this purpose, there was erected at Camp Lazear a small frame house consisting of one room 14 by 20 feet, and known as "Building No. 1," or the "infected clothing and bedding building." The cubic capacity of this house was 2,800 feet. It was tightly ceiled within with tongue and grooved boards, and was well battened on the outside. It faced to the south and was provided with two small windows, each 26 by 34 inches in size. These windows were both placed on the south side of the building, the purpose being to prevent, as much as possible, any thorough circulation of the air within the house. They were closed by permanent wire screens of 0.5 millimeter mesh. In addition, sliding glass sashes were provided within and heavy wooden shutters without; the latter intended to prevent the entrance of sunlight into the building, as it was not deemed desirable that the disinfecting qualities of sunlight, direct or diffused, should at any time be exerted on the articles of clothing contained within this room. Entrance was effected through a small vestibule, 3 by 5 feet, also placed on the southern side of the house. This vestibule was protected without by a solid door and was divided in its middle by a wire screen door, swung on spring hinges. The inner entrance was also closed by a second wire-screen door. In this way the passage of mosquitoes into this room was effectually excluded. During the day and until after sunset the house was kept securely closed, while by means of a suitable heating apparatus the temperature was raised to 92 to 95° F. Precaution was taken at the same time to maintain a sufficient humidity of the atmosphere. The average temperature of this house was thus kept at 76.2° F. for a period of sixty-three days.

November 30, 1900, the building now being ready for occupancy, three large boxes filled with sheets, pillow slips, blankets, etc., contaminated by contact with cases of yellow fever and their discharges, were received and placed therein. The majority of the articles had been taken from the beds of patients sick with yellow fever at Las Animas Hospital, Habana, or at Columbia Barracks. Many of them had been purposely soiled with a liberal quantity of black vomit, urine, and fecal matter. A dirty "comfortable" and much-soiled pair of blankets, removed from the bed of a patient sick with yellow fever in the town of Quemados, were contained in one of these boxes. The same day, at 6 p. m., Dr. R. P. Cooke, acting assistant surgeon, United States Army, and two privates of the hospital corps, all non-immune young Americans, entered this building and deliberately unpacked these boxes, which had been tightly closed and locked for a period of two weeks. They were careful at the same time to give each article a thorough handling and shaking, in order to disseminate through the air of the room the specific agent of yellow fever, if contained in these fomites. These soiled sheets, pillow-cases, and blankets were used in preparing the beds in which the members of the hospital corps slept. Various soiled articles were hung around the room and placed about the bed occupied by Dr. Cooke.

From this date until December 19, 1900, a period of twenty days, this room was occupied each night by these three non-immunes. Each morning the various soiled articles were carefully packed in the aforesaid boxes, and at night again unpacked and distributed about the room. During the day the residents of this house were permitted to occupy a tent pitched in the immediate vicinity, but were kept in strict quarantine.

December 12, a fourth box of clothing and bedding was received from Las Animas Hospital. These articles had been used on the beds of yellow-fever patients, but in addition had been purposely soiled with the bloody stools of a fatal case of this disease. As this box had been packed for a number of days, when opened and unpacked by Dr. Cooke and his assistants, on December 12, the odor was so offensive as to compel them to retreat from the house. They pluckily returned within a short time, however, and spent the night as usual.

December 19 these three non-immunes were placed in quarantine for five days and then given the liberty of the camp. All had remained in perfect health, notwithstanding their stay of twenty nights amid such unwholesome surroundings.

During the week, December 20–27, the following articles were also placed in this house, viz: Pajamas suits, 1; undershirts, 2; nightshirts, 4; pillow-slips, 4; sheets, 6; blankets, 5; pillows, 2; mattresses, 1. These articles had been removed from the persons and beds of four patients sick with yellow fever, and were very much soiled, as any change of clothing or bed-linen during their attacks had been purposely avoided, the object being to obtain articles as thoroughly contaminated as possible.

From December 21, 1900, till January 10, 1901, this building was again occupied by two non-immune young Americans, under the same conditions as the preceding occupants, except that these men slept every night in the very garments worn by yellow-fever patients throughout their entire attacks, besides making use exclusively of their much-soiled pillow-slips, sheets, and blankets. At the end of twenty-one nights of such intimate contact with these fomites, they also went into quarantine, from which they were released five days later in perfect health.

From January 11 till January 31, a period of twenty days, "Building No. 1" continued to be occupied by two other non-immune Americans, who, like those who preceded them, have slept every night in the beds formerly occupied by yellow-fever patients, and in the nightshirts used by these patients throughout the attack, without change. In addition, during the last fourteen nights of their occupancy of this house they have slept each night with their pillows covered with towels that had been thoroughly soiled with the blood drawn from both the general and capillary circulation, on the first day of the disease, in the case of a well-marked attack of yellow fever. Notwithstanding this trying ordeal, these men have continued to remain in perfect health.

The attempt which we have therefore made to infect "Building No. 1," and its seven non-immune occupants, during a period of sixty-three days, has proved an absolute failure. We think we can not do better here than to quote from the classic work of La Roche.[1] This author says: "In relation to the yellow fever, we find so many instances establishing the fact of the non-transmissibility of the disease through the agency of articles of the kind mentioned, and of merchandise generally, that we can not but discredit the accounts of a contrary character assigned in medical writings, and still more to those presented on the strength of popular report solely. For if, in a large number of well-authenticated cases, such articles have been handled and used with perfect impunity, and that, too, often under circumstances best calculated to insure the effect in question, we have every reason to conclude that a contrary result will not be obtained in other instances of a similar kind; and that, consequently, the effect said to have been produced by exposure to those articles must, unless established beyond the possibility of doubt, be referred to some other agency."

The question here naturally arises, How does a house become infected with yellow fever? This we have attempted to solve by the erection at Camp Lazear of a second house, known as "Building No. 2," or the "infected-mosquito building." This was in all respects similar to "Building No. 1," except that the door and windows were placed on opposite sides of the building so as to give through-and-through ventilation. It was divided, also, by a wire-screen partition extending from floor to ceiling, into two rooms 12 by 14 feet and 8 by 14 feet, respectively. Whereas all articles admitted to Building No. 1 had been soiled by contact with yellow-fever patients, all articles admitted to Building No. 2 were first carefully disinfected by steam before being placed therein.

On December 21, 1900, at 11.45 a. m., there were set free in the larger room of this building 15 mosquitoes (*C. fasciatus*), which had previously been contaminated by biting yellow-fever patients, as follows: One, a severe case, on the second day, November 27, 1900, twenty-four days; 3, a well-marked case, on the first day, December 9, 1900, twelve days; 4, a mild case, on the first day, December 13, 1900, eight days; 7, a well-marked case on the first day, December 16, 1900, five days; total, 15.

Only one of these insects was considered capable of conveying the infection, viz, the mosquito that had bitten a severe case twenty-four days before; while three others—the twelve-day insects—had possibly reached the dangerous stage, as they have been kept at an average temperature of 82 F.

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[1] R. La Roche, Yellow Fever, vol. ii, p. 516, Philadelphia.

At 12 noon of the same day, John J. Moran—already referred to as Case 2 in this report—a non-immune American, entered the room where the mosquitoes had been freed, and remained thirty minutes. During this time he was bitten about the face and hands by several insects. At 4.30 p. m., the same day, he again entered and remained twenty minutes, and was again bitten. The following day, at 4.30 p. m., he, for the third time, entered the room, and was again bitten.

Case 7.—On December 25, 1900, at 6 a. m., the fourth day, Moran complained of slight dizziness and frontal headache. At 11 a. m. he went to bed, complaining of increased headache and malaise, with a temperature of 99.6° F., pulse 88; at noon the temperature was 100.4° F., the pulse 98; at 1 p. m., 101.2° F., the pulse 96, and his eyes were much injected and face suffused. He was removed to the yellow-fever wards. He was seen on several occasions by the board of experts and the diagnosis of yellow fever confirmed. (See Chart VIII.)

The period of incubation in this case, dating from the first visit to Building No. 2, was three days and twenty-three hours. If reckoned from his last visit, it was two days and eighteen hours. There was no other possible source for his infection, as he had been strictly quarantined at Camp Lazear for a period of thirty-two days prior to his exposure in the mosquito building.

During each of Moran's visits two non-immunes remained in this same building, only protected from the mosquitoes by the wire-screen partition. From December 21, 1900, till January 8, 1901, inclusive—eighteen nights—these non-immunes have slept in this house, only protected by the wire-screen partition. These men have remained in perfect health to the present time.

December 28, after an interval of seven days, this house was again entered by a non-immune American, who remained twenty-five minutes. The subject was bitten by only one insect. The following day he again entered and remained fifteen minutes, and was again bitten by one mosquito. The result of these two visits was entirely negative. As the mortality among the insects in this room, from some unknown cause, had been surprisingly large, it is possible that the subject was bitten by insects not more than thirteen days old, in which case they would probably not infect, since they had been kept for only five days at a temperature of 82° F., and for eight days at the mean temperature of the room, 78° F.

Be this as it may, nothing can be more striking or instructive as bearing upon the cause of house infection in yellow fever than when we contrast the results obtained in our attempts to infect Buildings No. 1 and No. 2; for whereas in the former all of seven non-immunes escaped the infection, although exposed to the most intimate contact with the fomites for an average of twenty-one nights each; in the latter, an exposure, reckoned by as many minutes, was quite sufficient to give an attack of yellow fever to one out of two persons who entered the building—50 per cent.

Thus at Camp Lazear, of seven non-immunes whom we attempted to infect by means of the bites of contaminated mosquitoes, we have succeeded in conveying the disease to six, or 85.71 per cent. On the other hand, of seven non-immunes whom we tried to infect by means of fomites, under particularly favorable circumstances, we did not succeed in a single instance. Out of a total of eighteen non-immunes whom we have inoculated with contaminated mosquitoes since we began this line of investigation, eight, or 44.4 per cent. have contracted yellow fever. If we exclude those individuals bitten by mosquitoes that had been kept less than twelve days after contamination, and which were, therefore, probably incapable of conveying the disease, we have to record eight positive and two negative results—80 per cent.

CONCLUSIONS.

1. The mosquito—*C. fasciatus*—serves as the intermediate host for the parasite of yellow fever.
2. Yellow fever is transmitted to the non-immune individual by means of the bite of the mosquito that has previously fed on the blood of those sick with this disease.
3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.
4. The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.
5. Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of this disease.
6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against the subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.
7. The period of incubation in thirteen cases of experimental yellow fever has varied from forty-one hours to five days and seventeen hours.

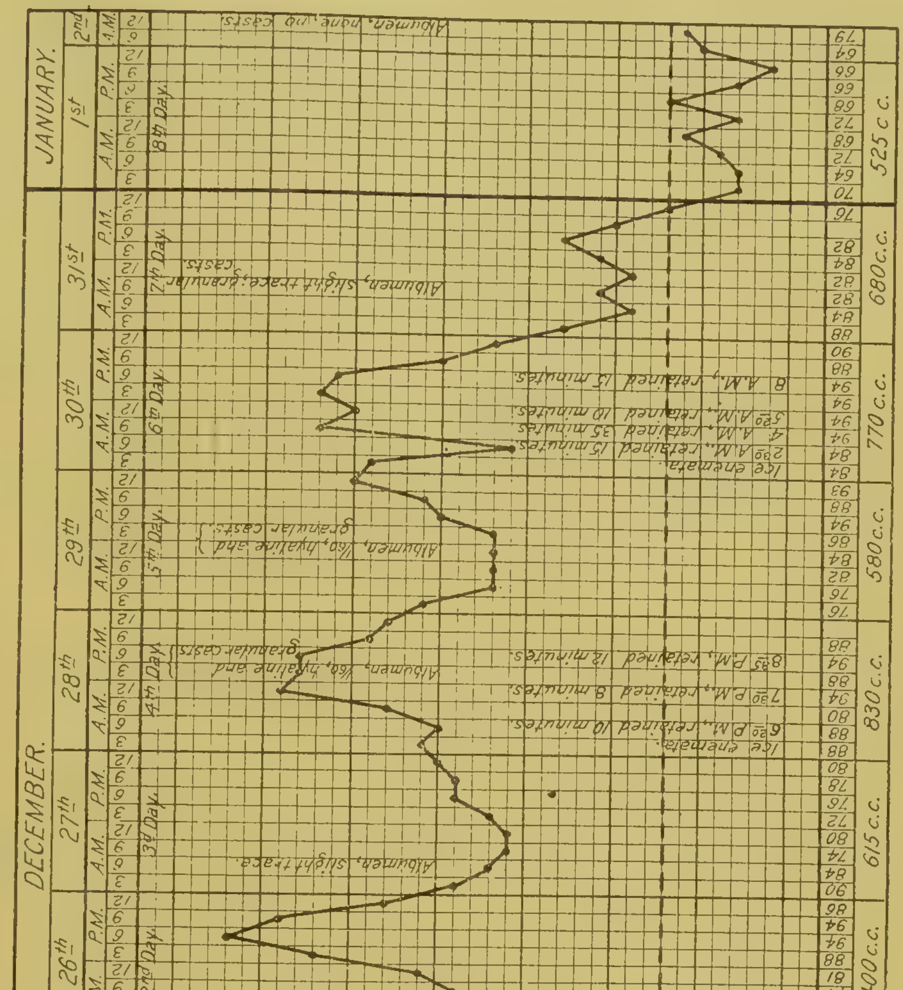

CHART VI.—*Yellow fever, produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 23 hours.]

8. Yellow fever is not conveyed by fomites, and hence disinfection of articles of clothing, bedding, or merchandise, supposedly contaminated by contact with those sick with this disease, is unnecessary.

9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes capable of conveying the parasite of this disease.

10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.

11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.

The constitution of this board and the instructions for its guidance were published in my last annual report, page 21. During the year First Lieut. Richard P. Strong, assistant surgeon, United States Army, became president of the board on account of the relief of Lieut. Jere B. Clayton, assistant surgeon, United States Army, and his return to the United States for home service. First Lieut. W. C. Calvert, assistant surgeon, United States Army, was assigned to fill the vacancy on the board.

Much excellent work has been done by this board in the study of animal parasites, dysentery, fevers, bubonic plague, and other tropical diseases, while some valuable reports have been received from medical officers not members of the board. Under date of December 14, 1900, the chief surgeon, Division of the Philippines, reported that Lieutenant Strong, president of the board, had reached certain conclusions regarding the pathology of animal parasitic diseases and diseases peculiar to the Tropics which would be of value as diagnostic aids in caring for patients in the hospitals in the Philippines, and suggested that authority be given to publish, in the shape of circulars to the medical officers of the command, such excerpts from the reports on these subjects as might be deemed of general value. This authority was granted, and shortly afterwards Circulars on Tropical Diseases Nos. I, II, and III were published. Circular No. I, by Lieut. R. P. Strong, published in February, 1901, discusses the subject of animal parasites. Circular No. II, also by Lieutenant Strong, published in April, 1901, gives full information concerning dysentery and its causes. The substance of this circular was published in my last annual report, pages 251–273. Circular No. III, by Lieut. W. J. Calvert, assistant surgeon, United States Army, published in May, 1901, consists of an epitome of our knowledge on the subject of bubonic plague. The value of these circulars has been so highly appreciated by medical men that calls for copies of them are constantly being received.

Valuable articles have been submitted by Joseph J. Curry, acting assistant surgeon, United States Army, one of the members of the board. These, however, have already been published in the Boston Medical and Surgical Journal: "Pathological laboratories in the Philippines," in the issue of February 21, 1901, page 175; "Dysenteric diseases in the Philippines," in the same issue, page 177; "Bubonic plague—Report on the plague in Manila, P. I., from January 1, 1900, to June 30, 1900," in the issue of March 21, 1901, and, lastly, "The fevers of the Philippines—A preliminary report on the nature of the fevers prevalent in the Philippine Islands, including typhoid fever, Malta fever, the malarial fevers, and undetermined tropical fevers," in the issue of May 9, 1901, page 446.

An interesting report on beri-beri, as it prevailed in the prisons at Lingayen, Pangasinan, P. I., was rendered June 4, 1901, by Acting Asst. Surg. Frank L. R. Tetamore, United States Army, which is submitted below, page 236.

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.

CIRCULAR NO. 1.

ANIMAL PARASITES.

The study of the intestinal parasites is based upon 1,793 stool examinations and upon the scrutiny of the intestinal contents from 386 necropsies.

The brief descriptions are given of the parasites as they occur in these islands, and sometimes not with the idea of adding anything new, either to their life history, anatomical structure, or pathological significance. They are recorded in this form because it is hoped they may give some idea to physicians who have lately arrived in the Philippines of the more common intestinal parasites to be encountered here. A word on treatment has been suggested, as our surgeons have sometimes found literature very scarce in the provinces.

PROTOZOA.

Two varieties of the class Sarcodina have been encountered.

I. *Amœba dysenteriæ.*—This amœba varies from 20 to 48μ in diameter. It possesses an endosarc and ectosarc which can readily be distinguished when the parasite is in motion. The endosarc is granular and usually incloses several vacuoles of variable size and, very frequently, red blood corpuscles. The larger forms may contain from 20 to 25 red blood cells. Pigment granules and bacteria have also been observed lying in the endosarc. On one occasion a red corpuscle which contained a tertian malarial parasite was seen inclosed in an amœba.

The parasite moves about by means of pseudopodia; blunt processes consisting of the ectosarc are first protruded, and into these protrusions the protoplasm of the endosarc appears to flow. The parasite possesses a nucleus which may often be observed in the living forms, but which can be more clearly seen in preparations stained with thionin. The nucleus is usually placed eccentrically and frequently contains a nucleolus. Sometimes in stools that have contained motile amœbæ, after a time round bodies appear which are suggestive of, and may perhaps represent, the forms described as encysted amœbæ. They have a double outline and generally inclose several round vesicles. It is still doubtful, however, whether these forms are really encysted amœbæ. We have occasionally observed what were apparently degenerating amœbæ. They appeared swollen, with an almost homogeneous central portion containing often a nucleus eccentrically placed and a few fine granules; outside this central portion and extending completely around it was a clear rim, containing sometimes several round bodies resembling fat droplets. Possibly these forms are allied to those described by Kruse and Pasqualle and called dropsical and colloid degenerations of amœbæ. Rarely were they observed to have any movement.

The above amœba is apparently identical with the *Amœba dysenteriæ* of Councilman and Lafleur. It has been encountered in the stools of nearly 500 cases of dysentery, and only on two occasions was it met with in the stools of individuals where no symptoms of amœbic dysentery existed at the time. One of these cases, however, had recently had dysentery. When they are present in very large numbers, the stools contain, generally, both blood and mucus, epithelial cells, and leucocytes. Portions of the stool may be at times well formed. In other instances, when they are not so abundant, the stools may be dark and fluid and contain very few red cells, but a variable number of epithelial cells and leucocytes. These amœbæ have also been found at necropsy in the lesions of the large intestine in 94 cases of dysentery. The lesions found in these cases agree with those generally accepted of amœbic dysentery. They consisted, briefly, of hemorrhagic catarrhs, always with the development of well-marked ulcerations of the large bowel. The ulcerations were circumscribed with even or ragged edges and often undermined, their bases clean, or sloughing and gangrenous. Microscopically, the parasites were found in the mucosa, submucosa, and sometimes along the intermuscular septa.

These amœbæ have also been found present in 18 liver abscesses. The abscesses answer to the description generally given of the tropical or amœbic variety. On two occasions, where they had perforated, the amœbæ were found in abscess cavities of the right lung. In 8 of the liver-abscess cases the amœbæ were associated with bacteria. In 2 early liver abscesses the amœbæ were present and bacteria absent.

These amœbæ are pathogenic for cats, and when they are injected into the rectum of these animals, either when in the feces and in combination with bacteria, or when in the contents of liver abscesses in which no bacteria are present, they are generally capable of giving rise to dysentery and dysenteric ulcerations of the large intestine, though the results are not invariable. The ulcerations are often very striking in their resemblance to those found in the large bowel in human amœbic dysenteric cases. We have been able to produce early ulcerations in three or four days after inoculation; after one week the ulcerations may be well marked.

Our attempts to cultivate these amœbæ in sterilized straw infusions have been unsuccessful. In unsterilized straw infusions straw amoebae usually developed, which made any definite observations in regard to *Amœba dysenteriæ* uncertain.

We believe this amœba (*Amœba dysenteriæ*) to be the etiological factor in producing the lesions of amœbic dysentery and of amœbic liver abscesses, doubtless often aided by bacteria in bringing about the pictures seen in these diseases.

Too much stress can not be placed on the presence of *Amœba dysenteriæ* in the stools. In the Tropics, where the disease amœbic dysentery prevails to a very great extent, robust, strong men may be victims for a month or two without being aware that they are suffering from a serious malady. The clinical symptoms of the disease are often not in accord with the lesions of the large intestine. The intermittent periods of the dysentery, with often a few days' constipation, sometimes mislead the doctor and frequently the soldier; the latter, thinking himself cured, is anxious to return to duty. Our notes show a large number of cases that have been admitted to the hospitals, not once or twice, but some four and five times, and on each occasion with a diagnosis of diarrhea. These cases remain in the hospital from four or five days to a week or two; they then return to duty, when an exacerbation of the disease brings them to the hospital again; they gradually become weaker and weaker, until one finds them upon the necropsy table with advanced lesions of amœbic dysentery. Such histories are not very uncommon. The diagnosis can often not certainly be made without a microscopical examination of the stools, but once made, the local treatment with high quinine enemata should be begun and continued (often for several months) until the patient is cured. The treatment of the disease for a few days is useless. The early, careful, patient, and continued treatment gives at times good results, and often reverses the almost hopeless prognosis of the neglected cases. The surgical treatment of the disease is also to be considered in the cases that do not yield to treatment with enemata.

The *A. dysenteriæ* is the intestinal parasite most often encountered in Manila. One hundred and fourteen of 386 deaths among our troops were due to amœbic dysentery, and this malady disables many more men here than any other disease.

II. Amœba coli.—This amœba generally varies from 12 to 25μ in diameter. It likewise, as *A. dysenteriæ*, contains an endosarc and ectosarc and is endowed with similar movements. The protoplasm is not so refractive. The granules are variable in size. They may be coarser, but are more often smaller and very difficult to distinguish. The vacuoles are neither so large or so frequently present. The nucleus is small and with difficulty seen in live specimens. These amœbæ have never been observed to contain red-blood corpuscles. They apparently have no pathogenic action on cats. Repeated injection of the stools containing these amœbæ together with the intestinal bacteria have always failed to produce dysentery or dysenteric lesions in cats. They have been encountered 8 times out of 200 examinations of the stools of different individuals where we had purposely looked for them. The patients neither had diarrhea nor dysentery, and no history of these troubles. The amœbæ were found in the liquid stools after the administration of rochelle salt.

Two other cases infected with this same variety of amœba were under our observation for three months. During this time they never had any symptoms of diarrhea or dysentery. Small, motile amœbæ, never measuring more than 25μ in diameter, could always be found in their stools after a dose of salts had rendered the movements soft and watery.

Anyone who recognizes the difference between the tertian and quartan malarial parasite, should be willing to admit that *amœba coli* and *amœba dysenteriæ* are distinct varieties; indeed we have as much, if not more, evidence for recognizing the difference between these two than in the case of the tertian and quartan malarial parasite.

The amœbæ of this second variety (*A. coli*) are apparently similar to those that Schuberg and Grassi encountered and are probably the same variety that Cunningham found in cholera stools. Finally, it is not unlikely that they are the same that numerous other observers have found occasionally in epidemics of acute dysentery and where it is mentioned that amœbæ were found in only one or two of the cases studied. These amœbæ have seemed to us apparently harmless.

Great variation in the size of amœbæ found in the stools is given in the literature on this subject. Thus the amœbæ found in dysenteric stools have been estimated in size from 10 to 50μ in diameter. We admit that amœbæ measuring from about 12 to 18μ in diameter might be found in dysenteric stools, but we can not agree that they are *A. dysenteriæ*. We have rarely observed *A. dysenteriæ* with a diameter of less than 25μ, and when we recall that this is less than four times the diameter of a red-blood corpuscle, the statement does not seem unreasonable. On the other hand, the diameter of amœbæ in non-dysenteric stools has been given from 12 to 36μ. It is not necessary for a stool containing *A. dysenteriæ* to be at the time a typical dysenteric stool. It is well known that the character of the stools in amœbic dysentery is often variable. We have never observed that the harmless amœbæ we found in the stools of our cases measured over 25μ in diameter; they generally more often varied from 14 to 22μ. In speaking of the diameter we have inferred, of course, the stage when the parasite is nearly circular in outline.

INFUSORIA.

Balantidium coli (*Stein*).—But one variety of the order of Heterotricha has been observed, viz, the *Balantidium coli* (Stein), *Paramecium coli* (Malmsten.)

This infusoria measures from 70 to 100μ long by 60 to 70μ broad. The periphery is covered with fine, actively motile cilia. At the anterior end is a funnel-shaped entrance, which is surrounded by cilia, and which, when the parasite is moving, gives the appearance of a revolving paddle wheel. An endosarc and ectosarc may be distinguished, and the parasite possesses the power to change its shape and may appear quite round. The endosarc contains a large, somewhat kidney-shaped nucleus and two contractile vacuoles. The surface is lightly striated longitudinally. In the posterior end is an anus, from which particles were observed at times to pass. The anterior end is more pointed than the posterior and more tapering. As many as 200 of these infusoria have been found in each drop of the fæces. The parasite is capable, when present in large numbers, of causing severe chronic diarrhea. The study of sections of the intestine, from a recent fatal case, shows the parasite all through the mucosa and passing through the muscularis and submucosa; some of the sections show the parasite lying along the intermuscular septa of connective tissue in nests and penetrating for a short distance between the muscular layers. There is an extensive eosinophilia in the mucosa, muscularis mucosæ, submucosa, and lymph follicles; this process seems more marked in the submucosa. The mucosa shows areas of necrosis and of hemorrhage, with cellular infiltrations and desquamation of cells. In the submucosa there are also infiltrations of cells. These cells consist of lymphocytes, eosinophiles, and a moderate number of plasma cells. The vessels are all injected; many of them seem considerably dilated and their number increased. Many of the veins contain the parasites, and about some of these small hemorrhages and infiltrations with cells have apparently occurred. The lymph follicles are swollen. These changes occur in the large intestine and in the ileum of the small intestine.

The parasite has generally been regarded as an almost harmless one, but from the clinical symptoms and lesions found at necropsy, in our recently reported case, Johns Hopkins Hospital Bulletin, 1901, we cannot take this view of it.[1]

Henschel has recommended for the treatment of the disease the employment of enemata of acetic acid, grams 50, with tannic acid, grams 5 to 2,000 cubic centimeters of water. Ortman has used quinine enemas 1 to 1,000, with good results. In our case, which was, however, one of severe infection, neither silver nitrate nor quinine enemata had any apparent influence over the course of the disease. The parasite is apparently not a very common one, as Mitter (Bietrarg zur kenntniss des Balant. Coli. Kiel Inaug. Dissert.), in 1891, was able to collect only 28 cases from the literature. No mention of any pathological histology is made in this dissertation. Since this date de la Chappelle (Finska lak sulskhardl Helsingfors, 1896, 38. 1941, 1951) has reported two other cases in man. Leuckart has found a similar, if not identical, species in the intestine of the hog. Grassi insists that this species is a distinct one.

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[1] Since writing the above we have met with a case infected with the *Balantidium minutum* (Jacoby and Schandinn). The patient suffered from dysentery, but as the *Amœba dysenteriæ* was also present in the stools, the significance of this infusoria can not be stated in this case.

The *B. minutum* resembles the *B. coli*, but it does not measure over 40μ long; the mouth is more prominent, and there is but one contractile vacuole. There is no apparent paddle-wheel movement of the cilia about the mouth when the parasite is in motion. There can be no doubt but that the *B. minutum* is a distinct parasite from the *B. coli*, but as in Jacoby and Schandinn's case it was associated with ankylostoma and strongyloides intestinalis infection, and in our own with *Amœba dysenteriæ*, its significance is still doubtful.

The diagnosis may be readily made from the microscopical examination of the fæces, where the infusoria are found.

MASTIGOPHORA.

Flagellates.—Three flagellates have been observed. The first flagellate is pear shaped, with a rapidly-moving flagellum situated on the rounded anterior end. It possesses an undulating membrane, which also moves very rapidly and sometimes gives the appearance of one or several flagella. The posterior extremity tapers to a point, attached to which is also often a single though less rapidly moving flagellum. Sometimes forms, apparently identical with these in every way except that they possess no flagellum on the posterior end, have been observed; but, on the other hand, forms with this posterior flagellum have been distinctly made out. The flagellate moves about very quickly, with darting like movements. It is capable of changing somewhat its outline and of pushing out short pseudopodia. It does not generally measure over 14 or 15μ.

The second is smaller than the first described. It is sometimes a little larger, or may even be a little smaller than a red-blood corpuscle. Its shape is generally round, but at one point on its diameter is a protrusion which slightly tapers to a point. We have been able to make out but one flagellum. It revolves continually when it is in motion, and moves about over the slide in this way; but its movements are not darting or nearly so agile as in the first variety.

The third variety is somewhat pear-shaped. The rounded anterior end presents a distinct cup-shaped excavation. On the lateral margins of the excavation are two flagella, extending downward along the sides of the parasite. On the lower edge of the cup-shaped area are two more flagella also extending downward. The posterior end is somewhat drawn out to a point and also possesses a pair of flagella. Situated in the upper portion are two round bodies resembling a double nucleus, connected by a narrow band. It is usually a little larger than the first variety in size, measuring about 16μ in its greatest diameter. Its movements in the fæces are sometimes sluggish, or it may be perfectly quiet, when its structure can more easily be made out. This flagellate is apparently identical with the *Megastoma entericum* of Grassi, except that we have observed only two flagella instead of four on the posterior lip of the excavation. It is probably the same flagellate that Lambl observed in 1859 and called the "*Cercomonas intestinalis*," thinking that he had seen the same parasite that Davaine had named in 1854 "*C. hominis*." This fact probably led to the statement of Butschli and Perroncito that the *Megastoma entericum* and the *Cercomonas intestinalis* are identical.

The second flagellate that we have mentioned is probably identical with the *C. hominis* of Davaine, while the first resembles the *Trichomonas vaginalis* of Donné, with the exception that at the rounded end only one instead of four flagella have been observed.

Donné's description was made in 1837, and we think that perhaps the one flagellum, when in rapid motion, might have been mistaken for several. When the parasite becomes attached to an epithelial cell, the single flagellum of the first variety we have described can be definitely seen.[1]

We shall not attempt to identify further these three protozoa with the large number and many indefinite flagellates described by other observers. Both the nomenclature and descriptions of the mastigophora found in man need careful revision.

The first of these flagellates has been encountered in 262 cases. In 137 of these it was the only parasite found present in the stools; in 78 it was associated with *amœba dysenteriæ* alone, and in 10 it was found with this parasite and the second variety of the flagellates described. In 21 cases it was found with the second or third variety alone. In 3 cases it was found in connection with *Amœba coli*. In the remaining number of cases it was associated with other intestinal parasites. Evidently it is a very wide-spread and common invader of the intestine.

The second and third flagellates have been encountered 62 times in the stools; 42 and 20, respectively. In 21 cases they occurred either singly or together and in the remaining number with other intestinal parasites.

All of these flagellates have been found in greater numbers in dysenteric and diarrheal stools. They are also found in the soft stools of individuals with apparently no intestinal disturbances, particularly in the stools of children. It is not unlikely that they may, when present in large numbers, cause some intestinal irritation, perhaps by their mechanical movements.

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[1] If, however, other observers insist that four flagella instead of one exist on the rounded end of the *Trichomonas vaginalis*, our first flagellate is not only not identical with it, but can not be placed in the family *Trichomonaidæ*.

CESTODES.

Of the *Tænia*, only two of the adult forms have been observed. *T. saginata* and *T. solium* both exist. The former is the one most frequently seen in our soldiers; the latter occurs occasionally in the natives, who eat a great deal of uncooked pork. Only very brief descriptions of these parasites will be given, as no particular investigations have been made in regard to them, except that their occurrence has been noted.

Tænia solium.—*T. solium* (pork tapeworm) may attain a length of from 2 to 3.5 meters; the number of segments may reach 850. The first proglottides or segments are short, but their length increases from the head downward, and may eventually slightly exceed their width. About 130 centimeters below the head, the segments become mature and measure about 1 centimeter long by 7 to 8 millimeters wide. Their corners are rounded. The segments possess both male and female generative organs. The uterus consists of a median tube with not over 14 (generally from 7 to 12) lateral branches, which are widely separated. The sexual opening is near the posterior border, and may be on either side; that of the female is located just back of the male orifice and in the same sexual cloaca. The testicles appear as numerous small vesicles. The ovary is double. The vagina widens into the seminal vesicle, which passes to form the so-called "globular body." The uterus is at first a straight canal situated anteriorly. When the eggs enter the uterus from the globular body, its lateral branches grow out and become filled with eggs.

The neck is small, filiform-like and measures about 3 centimeters in length. It is surmounted by the head, which is small and spherical, and contains 4 ring-shaped suckers. Between these, the crown of the head is surmounted by a ring of short hooklets, usually numbering from 24 to 27 and arranged in a double row. The parasite attains its full growth in from three to three and one-half months. The eggs measure from .03 to .035 millimeter in diameter; they are round, brownish or yellow in color, and possess a thick shell which is covered with fine, closely-placed spicules. In the complete egg, outside the shell, is an albuminous layer which contains small nuclei and which represents the vitelline membrane. Each ovum contains an embryo, provided with 6 hooklets. When these ova are taken into the stomach, either of man or of the pig, the shell is dissolved and the 6-hooked embryo passes from the stomach, or through the bowel wall, and may work its way into the viscera, muscles, connective tissues, brain, or eye. The symptoms of infection with *T. solium* are usually gastro-enteric and nervous. The diagnosis may be made by an examination of the stools of infected individuals. The ripe proglottides are discharged singly or in chains. The ova are often also found in the fæces. The arrangement of the uterine convolutions, as well as the head, serve easily to distinguish the parasite from *T. saginata.* Tænia solium inhabits the small intestine, where its head is often well protected beneath the valvulæ conniventes. Tapeworm segments should be burned. Pork that has been in cold storage for over three weeks is generally safe to eat. If the pork is thoroughly cooked there is no danger of infection.

Treatment.—The drugs most recommended are male fern, pepo, and pomegranate. Their administration should be preceded by light diet and saline cathartics and followed by purgatives. Unless the head is brought away the cure is not successful, the parasite begins to grow, and after a few months the segments begin to reappear in the fæces. This parasite is often more difficult to expel than tænia saginata.

Cysticercus cellulosæ.—No case has been observed here in man, though this condition has been encountered on a number of occasions in slaughtered pigs, and occurs not infrequently in these animals here. As has been stated above, when the ovum of *tænia solium* is taken into the stomach of man or pigs, the embryo is set free and wanders through the bowel wall. An individual infected with *tænia solium* may infect himself with the ova of this parasite by means of his fingers, and thus become the intermediate host, which is the rôle generally played by the pig.

It has been suggested that by vomiting and retching the mature segments may pass from the intestine of one affected to the stomach of the same.

The freed embryo, having reached a resting place in the viscera or tissues, undergoes various changes, and in from a few weeks to months has formed a small cyst, generally measuring from 8 to 10 millimeters in diameter. From the wall of this cyst there grows into the interior a scolex; from the latter a new tapeworm head develops and a sac forms around it. The scolices possess the head, hooks, and suckers of the *tænia solium.* About these cysts there are usually evidences of a slight inflammation. Their pathological significance depends upon their number and situation. In the brain and eye they may give rise to serious trouble, though not always when present in these situations do they give rise to alarming symptoms. Pork infected with these cysts is said to be "measly." Man, after eating measley pork, becomes infected with *Tænia solium.* According to Professor Osler, except when the cysts are present in the eye, the diagnosis of *Cysticercus cellulosæ* can rarely be made.

Tænia saginata (*T. mediocanellata*—beef tapeworm): Measures from 4 to 7 meters in length. It may possess over 1,200 segments. Its proglottides are broader and thicker than those of *T. solium.* The mature segments measure from 14 to 18 millimeters in length and from 10 to 14 millimeters broad. The segments increase gradually from the head to about the middle of the parasite, then they become longer but thinner.

As in *T. solium,* each segment represents a separate animal, and possesses all the organs except the brain. The uterus, when fully developed, lies in the middle of the segment and is straight; it possesses from 25 to 39 lateral branches, which are very closely placed and do not generally show the tree-like branching seen commonly in the *T. solium,* but its branches divide more often dichotomously. The sexual pore opens usually at the side as a small papilla, but may open, rarely, on the flat surface. The testicles are numerous and join with the single penis. The vagina extends inward behind the spermatic chord.

The head is flat and not so delicate as in the *T. solium;* it is unarmed and possesses no rostellum or hooklets, but 4 sucking disks are present. It sometimes shows slight pigmentation. The ova are often a little larger than the eggs of the *T. solium,* but it is generally very difficult to tell the ova from one another. The eggs or segments when ingested by cattle give rise to the embryos which pass chiefly to the muscles of mastication, tongue, and heart and there form cysts similar to those which *T. solium* forms in the hog. The cysts of the former are, however, somewhat smaller than those of *Cysticercus cellulosæ,* measuring about 7 millimeters in length and about 3 millimeters wide. Beef containing these cysts is said to be measly. The cysts, if left undisturbed, eventually caseate and later calcify.

The *Tænia saginata,* as *T. solium,* gives rise in man to intestinal, nutritional, and sometimes reflex symptoms. As a rule the disturbances are not marked in otherwise healthy individuals infected with either parasite. *T. saginata* also inhabits the small intestine of man. The diagnosis of infection may be made when either the segments or eggs are found in the stools, though if the eggs are alone found one can not be sure whether *T. saginata* or *T. solium* is present in the small intestine.

Cold storage usually kills the cysticercus of *T. saginata* in beef in four days.

The cysticercus of *T. saginata* appears not to occur in man.

The treatment of individuals infected with this parasite is the same as described under *T. solium.*

Tænia echinococcus.—Inhabits the upper portion of the small intestine of the dog, with the exception of the first 10 to 15 centimeters below the pylorus. It is the smallest *Tænia* of the domestic animals, and often occurs in large numbers in them. According to most observes, it usually measures not over 4 to 5 millimeters long, though Deffke gives the length at from 5.5 to 9 millimeters.

According to Leuckart, the parasite possesses only three or four segments, of which the last one is mature and exceeds all the rest of the body in size.

The hooks are from 30 to 40 in number, and have stout, root-like processes which form two rows, the inner being the larger. Behind the circlet of hooks are situated four suckers. The eggs are round, and in the last segment number about 500. They have a chitinous covering. When the fourth segment is passed, its tissues decompose and the eggs are set free.

Either the eggs or proglottides, when ingested by man, or by pigs and certain other animals, are capable of causing echinococcus disease therein. On arriving in the stomach, the chitinous coat is dissolved and the embryo pushes its way through the gastric or intestinal walls. Leuckart has found them in the portal vessels.

As the liver is the organ most often affected by echinococcus cysts, and as the parasite has not been found in the lymphatics or wandering through the connective tissue, the blood vessels are perhaps their most common means of transmission to the various parts of the body. The embryos, on reaching their destination, which usually occurs in pigs about four weeks after they are fed with the proglottides of *Tænia echinococcus,* form small cysts which soon measure 1 millimeter in size. These cysts are capable of no motion. They continue to grow and after about three weeks may be as large as a walnut. The early cyst consists of a thick external, transparent covering, inclosing granular material. After a time, fluid begins to accumulate in the interior, and the exterior layer becomes slightly lamellated. A lining membrane begins to appear just inside the external layer. In this inner membrane, granules and cells and sometimes muscle fibers may be seen.

The lamellation of the external layer now becomes more marked and remains so, only it increases in thickness with age. This lamellation of the cuticular layer was always supposed to be a characteristic feature of all echinococcus cysts, but Carey and Lyon have recently shown in a primary undoubted echinococcus cyst of the pleura that this lamellation does not always occur in echinococcus cysts and hence is not absolutely characteristic of all of them. Gradually, outside of the cyst a capsule of connective tissue is formed.

While the above changes are going on, small elevations are formed on the germinal or internal layer. According to Naunyn, they are ciliated. This is the first step in the formation of the so-called "brood capsule." A cavity is gradually formed inside of them and becomes bounded by a delicate membrane; outside this layer, another cellular layer is formed. The arrangement of the layers suggests that the brood capsule may represent an invagination of the mother cyst. The brood capsules at times show active movement. The formation of the scolex begins as a thickening of the wall of the brood capsule. It gradually grows externally as a club-shaped process, still having in its interior a canal which connects with the interior of the brood capsule. At the bottom of the distal portion of the club-shaped process the hooks are formed; they first appear as bundles of prickles arranged in rows. Later the prickles disappear, except the foremost rows. The suckers are also formed here. After a longer time, muscle fibers and calcareous particles also appear. The head gradually becomes inverted into the cavity of the brood capsule, the walls covering its head become united to the hollow process, and the scolex is thus fixed to the interior of the brood capsule by a slender stalk (Leuckart).

In this way, many heads of different ages may come to lie in one capsule. In the enlarged cysts the inclosed capsules may number many thousands. The scolex resembles now a vorticella and the head has been observed at times to exhibit slight movements. The hooklets resemble somewhat those of the adult worm, only they are smaller.

The above description applies to the simple unilocular echinococcus cyst, or the so-called *echinococcus veterinorum*, which occurs more frequently in animals and is less common in man.

In the unilocular cyst, however, still another more complex process, viz, the formation of daughter cysts may occur. These consist of secondary and completely separated cysts, which may lie inside the primary cyst (endogenous type), or outside the primary cyst (exogenous type).

The endogenous type (*Echinococcus hydatidosus* Leuckart) is the one which usually occurs in man. The scolices may become vesicular and transform themselves by a similar process as in the brood capsule, or the condition may be brought about by infoldings of the parenchymatous layer. In either way, separate or daughter cysts are formed which lie within the parent cyst and correspond to them in structure. They may also give rise to scolices and hooklets. These daughter cysts may give rise by the same processess to granddaughter cysts (either endogenously or exogenously), and so on for several generations.

The exogenous type, less common in man, has been termed *Echinococcus simplex*, *E. granulosus* (Leuckart), etc. In this form the secondary cysts probably arise from the parenchymal layer. A peculiar variety of the exogenous type is the *E. multilocularis* (Virchow). It is usually found in the liver of man and may be small or occupy almost the whole lobe of the liver. Sections show a thick fibrous capsule and an internal honeycombed structure, the partitions being marked off by fibrous bands, which form by their meshes a number of small cavities. In these cavities are one or several gelatinous masses which represent degenerating hydatid vesicles. Often large cavities filled with exudation products and decomposing material are found in the liver in this form. The changes are supposed to be due to the growth of the brood capsule into the lymphatics, blood vessels, and bile ducts of the liver. These cysts may be sterile, but sometimes contain scolices and hooklets.

In man, the liver is the organ most commonly affected with hydatid cysts. The other organs, named in order of their relative frequency of infection, are the intestinal canal, bones, heart, and blood vessels. The cysts may occur in other organs and tissues.

Two cases of echinococcus cyst have been observed here in man, both at necropsy.

In the first case there existed a unilocular cyst, measuring 3 by 4 centimeters, and situated on the right lobe of the liver, and one in the omentum, measuring about 9 centimeters in diameter, with its walls adherent to the pylorus and duodenum. The cyst in the liver was degenerated; its walls were thickened and contained calcareous particles. In the interior was a yellowish, putty-like mass with a few gelatinous shreds. Microscopical examination showed cholesterin crystals, but no scolices or hooklets were found.

The cyst of the omentum contained clear yellowish fluid and a number of small gelatinous bodies (daughter cysts), measuring about 1 centimeter in diameter.

The characteristic lamellation could be observed in the cuticular layer of these cysts, and hooklets were also present.

The second case was observed during my illness, by one of my assistants, Hosp. Steward W. E. Musgrave, M. D.

This cyst was about the size of a walnut and also situated in the right lobe of the liver. Hooklets were found in this case by Contract Surg. J. J. Curry.

We have not seen the adult tænia echinococcus, and our description of this parasite follows, chiefly, that of Leuckart.

Treatment.—Medicines are of no value in the treatment of echinococcus cysts. A large number of the small cysts eventually calcify and become harmless. Operative measures are to be recommended when the cyst is large or likely to give trouble. Injection into the sac has given no good results. The cysts may be aspirated for confirmation of the diagnosis. The results of the Australian surgeons show that a large number of the cases recover after operation. During the seven years ending December 31, 1894, at the Adelaide Hospital, South Australia, 121 operations were performed on hydatid cysts, situated in the great cavities of the body. There resulted 101 recoveries and 20 deaths, a mortality of 16.5 per cent.

NEMATODES.

Ascaris lumbricoides.—The *A. lumbricoides* is the most common of the nematodes here. The female measures from 16 to 35 centimeters long; the male from 15 to 25 centimeters. The breadth usually measures 5 or 6 millimeters. Both sexes are cylindrical in shape and taper toward the ends, though the tapering is more gradual toward the cephalic extremity. In color they are yellowish-brown, reddish-brown, or pinkish. Their surfaces are glistening and striated transversely. Several bands, running longitudinally, can sometimes be made out. The parasite possesses three lips. The tail of the female is straight. That of the male is slightly curved anteriorly and possesses two small spicules. On the anterior surface of the curve a large number of papillæ may be seen. The vagina of the female opens ventrally about one-third of the length of the parasite from the head. The anus opens at the tip by a transverse slit. The parasite sometimes gives off an irritating substance, which is noticeable to the sense of smell. To this substance, Peiper, of Griefswald, has attributed the nervous symptoms sometimes noticed in persons infected with the parasite.

The ova measure 0.075 millimeter long by 0.060 millimeter wide. They are usually ovoid, but may be spherical, Their color is yellowish-brown or brownish-red. Their margins are uneven and wavy. The shell is double and surrounded by an albuminous covering. The contents of the ovum have a granular appearance. The eggs are resistant to drying and freezing. Davaine has shown that the dried ova may retain their vitality for over five years. The eggs require no intermediate host, and the transmission to man is direct. Eppstein states that the round worm attains sexual maturity in from ten to twelve weeks after ingestion of the eggs. Man is primarily infected generally through drinking water, or through uncooked vegetables, salads, etc. As the transmission is direct, he is capable of reinfecting himself whenever the ova, which are found in large numbers in the fæces, are carried by the fingers to the mouth, and which might happen with uncleanly persons when the fingers are soiled at stool. The parasite has caused considerable annoyance to regimental surgeons here, particularly among the volunteer regiments. Sometimes almost half of the command has been found to be infected with these worms.

The chief symptoms observed in the infected cases among our troops have been gastro-intestinal ones, the men very frequently vomiting large numbers of the worms.

The parasite has been usually found at necropsy in the upper portion of the small intestine, though sometimes in the large intestine. The diagnosis can be made by a microscopical examination of the stools in which the ova are present, or the round worms themselves may appear in the stools.

The cases usually readily yield to treatment with santonin.

Oxuris vermicularis.—Several cases of infection with this nematode have been observed. The female measures from 9 to 12 millimeters in length, and about 5 millimeters broad. The male is generally smaller, measuring not over 5 millimeters long. The head of both sexes is pointed. Protruding on each side from behind it, there is a swelling, lighter in color, and extending somewhat like a balloon, on each side of the œsophagus for a short distance. There are three small lips. The female is easily seen with the naked eye, and looks not unlike pieces of fine thread. The body is tapering for a short distance behind the head, to its awl-shaped tail. The anus opens at the base of the tail. The vagina opens ventrally just above the anterior half of the worm. The tail of the male is blunt and often curved spirally; it possesses only one spicule.

The ova measure about 50μ long by from 24 to 29μ broad. They are somewhat elliptical in shape, but one surface is curved and the other somewhat flattened. There is a thin albuminous covering to the shell. The eggs are not killed by drying. The transmission to man is direct. Individuals may reinfect themselves with their fingers, which have become infected with the ova in scratching.

The adult parasites inhabit the lower portion of the small and the large intestine. The male usually dies after fulfilling its sexual function, and is rarely found near the rectum. The female, after becoming impregnated, passes toward the rectum. The diagnosis may be made by finding the females in the rectum, vagina, or fæces. The ova have occasionally been observed in the fæces of those infected. The symptoms observed have been chiefly pruritis ani, with a resulting local dermatitis. The attacks of itching come on particularly at night.

Infection probably does not occur through drinking water, as Zenker has shown that in water the ova perish quickly. Uncooked fruit and vegetables, and the hands of infected individuals are, probably often, the primary means of infection.

In the treatment of cases infected with this parasite, it is to be remembered that the sexually mature forms are to be found in the small intestine and cæcum. Doses of santonin and rhubarb by the mouth, and enemas of quassia, aloes, or turpentine, are usually successful.

Barbagallo has recently recommended senna leaves, 15 grams; water enough to make a decoction of 80 grams; then add sodium sulphate, 8 grams; simple sirup, 20 grams. Mix, to be taken in two doses, one day intervening.

Tricocephalus dispar.—The *T. dispar* is a very common parasite in Manila, judging from the number of times the ova have been found in otherwise apparently normal fæces. It measures from 35 to 50 millimeters long, the female being a little larger than the male. The anterior portion is long and thread-like and contains the œsophagus. It expands rather suddenly into the posterior portion which contains the genital organs. The posterior extremity in the male is curved spirally and is surmounted by a single spicule. The vagina opens near the beginning of the posterior portion; both it and the uterus are filled with eggs. The parasite is striated transversely.

The eggs are oval in shape and their color is brownish. The shell is thick. It does not extend completely around the egg, but is deficient at the poles of the oval; here project two peg-like protrusions, which are of a lighter color than the rest of the egg and shell. The ova are possessed of great resisting powers. They may be frozen or dried without losing their vitality.

The transmission to man is direct. The embryo while still in the ovum is taken into the human stomach, where the shell is dissolved and the embryo liberated. The usual situation of the parasite is in the cæcum, or large intestine. Usually it lies loose in the bowel; sometimes the mouth appears fastened to the mucosa. Some observers have stated that the parasite is a blood-sucker and capable of causing considerable anæmia. Our experience has not been that with it, but we have not encountered any cases of severe infection with this parasite as yet.

The diagnosis may be confirmed by finding the ova in the fæces. The treatment is most unsatisfactory. Thymol, given in almost toxic doses, usually has no effect in expelling the parasite. Male fern and santonin are also generally useless. Fortunately there are no unfavorable symptoms in mild infections.

Trichina spiralis.—No case of trichinosis in man has been encountered by us here, but muscle trichinæ have been observed on a number of occasions in Manila hogs, so that it may be safely stated that trichinosis exists here, particularly in the natives, who raise and live intimately with large numbers of pigs, and who eat considerable pork.

The muscle trichina (larval form of *T. spiralis*) measures from 0.7 to 1 millimeter in length. It is cylindrical, tapering anteriorly until the extremity is quite thin and where the mouth opens. Posteriorly, it is larger and the extremity is rounded off; the anus opens here. The oesophagus is long and is surrounded with large cells on both sides. The sexual organs occupy the ventral portions of the posterior half of the body, and the sexes can often be distinguished. The parasites lie coiled up in a sort of cyst between the muscular fibres. The cysts are oval, with generally two projections at the poles. The capsule of the cyst is chitinous, and in the older ones laminated. A single cyst may contain one or several trichinæ.

In stained sections about the trichina, the muscle often stains poorly and the transverse section is indistinct or lost. In places, breaks in the muscle fiber occur. The muscle undergoes granular degeneration, while the muscle nuclei are greatly increased in numbers. Near the poles of the cysts are numerous lymphocytes and ephithelioid cells. The eosinophiles are increased in number about the parasites, and often the large mono-nuclear cells show also an apparent increase.

Though we have observed no case of trichinosis in Manila, as the parasite certainly occurs here, it may be well, from observations made elsewhere, to say a word in regard to the adult *trichina spiralis*, which may occur in the human intestine.

If a piece of meat containing the above-described cysts and embryos be eaten, the cysts are dissolved in the stomach and the parasites liberated. They quickly complete their development and copulate. The female gives birth to young trichina in about seven days after infection. The embryos are already hatched from the shell before they pass from the uterus. They soon penetrate through the intestinal wall, and finally come to rest in the muscular or other tissues, where they gradually become encysted.

The full-grown female measures from 3 to 4 millimeters in length, and resembles a small piece of white hair; the male is considerably smaller, generally not measuring over 2 millimeters. The dorsal extremity of the latter is provided with two conical-shaped pegs, which resemble somewhat an open pair of pincers; their use, apparently, is to fix the female in copulation. The pegs are separated by several papillæ. There is no spicule, but the cloaca is pushed out in copulation. The alimentary canal begins with a mouth, which appears as an intestine. It increases in caliber and passes into the general food canal. This is surrounded throughout the whole length by so-called "cell bodies," i. e., by rows of large cells, which are quite distinctive.

The stomach is represented by a flask-like dilatation and is covered by fine granular cells. It passes into the intestine which opens in a cloaca, together with the seminal duct at the posterior extremity. The testicle is represented by a pouch, situated near the posterior end. The male dies usually shortly after copulation.

In the female there is situated in the posterior extremity a pouch which represents the single ovary; it passes anteriorly into the single ovarian tube, which terminates in the vagina, about a quarter of the length of the parasite from the anterior extremity. The eggs develop within the uterus.

The diagnosis is rarely made by finding the adult trichinæ in the stools. They are short-lived and perhaps are often digested and destroyed. According to other observers they disappear from the intestine in from three to eight weeks. The details of the clinical symptoms in diagnosis can not be gone into here, but the recent important work of T. R. Brown, on the blood changes, deserves special mention. This observer has shown that a marked leucocytosis occurs, in which there is an extraordinary increase in the number of eosinophilic cells. These cells may form 68 per cent of all the leucocytes. This very important symptom may suggest the diagnosis. The work of Brown has been confirmed by Professor Osler, Blume, Cabbot, Kerr, Gordiner, and others. If the diagnosis has been made shortly after infection, the bowels should be thoroughly evacuated and kept loose; calomel has been particularly recommended. Glycerin, male fern, santonin, and thymol, have all been recommended for destroying the intestinal parasites. No medicines have any influence upon the embryos after they have passed through the intestinal wall.

Filaria.—But one case of filariasis has been observed. This patient had been living in Iloilo for the past two years. Dr. Maye, an English physician who has resided in Iloilo for a number of years, tells of two cases of undoubted chyluria which occurred in natives in Iloilo, who had also never been away from that place.

Our case was infected with *Filaria nocturna*. The embryo measured about 0.35 millimeter long, by 7.5 μ wide (photomicrographs showed it to be about the diameter of a red blood corpuscle in width). The posterior end is rounded off rather abruptly, while the anterior tapers gradually to a fine point. The nematode is inclosed in a sort of sheath which, though closely applied laterally, is longer than the parasite, and a clear space can be seen above and below the true body.

Manson has described a shiny, triangular V-shaped patch, situated about one-fifth of the entire length of the organism backward, and a second similar though smaller spot situated a short distance from the tail. He also states that the head possesses a six-lipped and very delicate prepuce. The V spots and lips are sometimes very difficult to observe in fresh specimens. The fresh embryos have a granular appearance. These embryos were not found in the blood of our patient during the day; they began to make their appearance in small numbers about 6 o'clock, and were most numerous in the blood specimens collected near midnight. The patient suffered from lymphatic swellings in the right groin and complained of pain in the right abdominal region. There was no chyluria present. He had irregular attacks of fever which lasted for a few days at a time, and in which his temperature sometimes registered 104°. An examination of his blood showed no malarial parasites; there was no leucocytosis present. A differential count showed, polymorphonuclear leucocytes, 64 per cent; small lymphocytes, 26 per cent; large and transitional forms, 7 per cent; eosinophiles, 3 per cent.

The adult parental forms of *Filaria nocturna* (i. e., *Filaria bancrofti*) measure, according to Manson, 94 millimeters in the female and 70 millimeters in the male.

They are generally found together in pairs and sometimes in groups of 6 or 7 coiled together. The males are more active and have their tails spirally twisted, as a vine. They possess two spicules of unequal length, from which spring delicate wavy threads. The extremity of the tail in both sexes is blunt. The head is club-shaped and the mouth terminal and simple.

In the female, the uterus is double and the vulva opens a short distance behind the mouth. The alimentary canal is also simple. The embryos are born in the lymph and, passing through the thoracic duct, enter the blood. The females of certain species of mosquitoes may act as the intermediate host of this parasite. These insects, in sucking the blood of an infected subject, receive also the embryonic filariæ. The latter pass to the stomach of this host and then escape from their sheathes. They next bore their way through the stomach wall and enter the thoracic muscles. After a passive larval condition, they begin to grow with great rapidity. According to Manson, they become furnished with a mouth, an alimentary canal and a three-lobed tail. About this time the mosquito deposits her eggs and, he conjectures, probably falls into the water and dies. The filariæ then escape from the dead bodies of the mosquitoes into the water and in this medium, he supposes, they pass into the stomach of man. Here they bore through the tissues and reaching the lymphatics attain their sexual maturity.

Very recently, however, C. G. Low, in a study of filariated mosquitoes (*Culex cilariasis*), has found the filariæ passing into the proboscis of the mosquito. He states that the parasite does not pass along the salivary duct, but makes an independent passage through the base of the labium and the hypopharynx. He thinks that it seems fair, therefore, to conclude that when the mosquito bites, the filaria finds its way into the human body along the proboscis.

Still more recently, however, Grassi and G. Noe have insisted that the filariæ are not free, as shown in Low's drawings, but are still inclosed in the prolongation of the general body-cavity within the labium. These authors further claim that the embryo does not pass to man in the way that Low has described, but by a different mechanism, viz: that in biting, the labium of the anopheles is bent, and, being stuffed with filariæ, the integuments of the labium are ruptured along the dorsa groove and through the rupture thus produced the filariæ come out to penetrate the body of their host. By a large number of experiments, they have shown that *Anopheles claviger* may become infected with filaria after biting a dog which is already infected with this parasite. Other healthy dogs become infected when bitten by these anopheles in turn, the filariæ passing from the mosquito into the circulation of the dog, as stated above. This, then, seems to be the probable mode of infection in man.

In regard to the treatment of the disease, no drug, so far as known, will destroy the embryos in the circulating blood. Austin Flint has, however, reported a case of chyluria cured with methylene-blue, 2 grams every four hours for five days. The surgical treatment, particularly the removal of the adult parasites from the enlarged lymph glands of the groin, is sometimes, though not always, successful in producing a cure.

The prevention of filarial disease consists in using drinking water not contaminated by mosquitoes, and in sleeping under mosquito nets. It is to be remembered that patients suffering from filariasis, particularly in hospitals, are to be regarded in the same light as those suffering from malaria, viz, as dangers to the community. Such cases should be isolated and kept under mosquito nets when mosquitoes are about.

Filaria cervina is not uncommon here in the abdominal cavities of cattle, and intraocular filaria (probably *papillosa*) occurs in the horse.

The Ankylostoma duodenale.—This nematode often gives rise to grave disturbances, and is not infrequently encountered here.

The male measures from 6 to 10 millimeters in length and from about 0.5 to 1 millimeter in breadth; the female is from 6 to 18 millimeters in length and is occasionally a little thicker than the male. They are grayish-yellow or grayish-red in color, or when filled with blood, they may be much swollen and dark-red in appearance. Generally, with the naked eye, about one-third the length of the body from the head, the beginning of the intestine may be distinguished by its darker color; particularly when the parasite contains much blood is this well marked off.

Microscopically, the cephalic extremity is generally bent dorsally. The mouth opens on the ventral side and contains six hook-like teeth, four in-curving and placed ventrally and two conical and placed dorsally. The œsophagus is cylindrical and somewhat vase-shaped, with a longitudinal cleft; its inferior extremity is rounded. Following the œsophagus comes the intestine. Two longitudinal bands of muscle extend downward on each side of the intestine. The surface is striated longitudinally. The parasites usually contain blood pigment and red-blood cells.

The female, which is three or four times as frequent as the male, may be distinguished from the latter by its caudal extremity, which is tapering and somewhat awl-shaped. The vulva lies behind the center of the body. It, also, is larger and contains more blood than the male. The caudal extremity of the male is dilated and forms the bursa copulatrix, which consists of a threefold fan-like apparatus from which issue two very fine, thread-like spicules, which represent the penis.

The adult parasites are not generally found in the stools, unless the patient has undergone treatment with an anthelmintic. The ova, however, are found in the fæces of those infected and give evidence by their numbers of the severity of the infection. The eggs are oval and measure about 45 to 68μ long and from 25 to 38μ broad. When seen in the fæces, they are already partially segmented into two, four, or eight cells; sometimes, but rarely, they show here further segmentation. The shell is transparent and there is a clear rim between the segmenting yolk and the shell. After three or four days under favorable circumstances the larvæ are hatched, and they then have the typical rhabditis form and resemble the embryos of the *Anguillula intestinalis*; though they are somewhat smaller then, and the œsophagus is relatively somewhat longer. The ankylostoma embryos are never found in the freshly passed fæces, however.

We have not been able to confirm the recent work of Giles, that the parasite represents an example of dimorphism or heterogenesis. The embryonic forms we were able to obtain soon died without further development. Cases of combined infection with the *Anguillula intestinalis* and the *Ankylostoma duodenale* are not uncommon, and it is possible that the adult, free-living generation of *Anguillula intestinalis*, or other free nematodes occurring in the culture media used might be mistaken for and as representing the parent stage of the free-living generation of *Ankylostoma duodenale*. However, it is only fair to state that Giles has apparently excluded these contaminations. His material seems to have been very abundant and his experiments carefully performed. Few have probably given this work the attention that he has done. At the same time, granting that the parasite has an adult free stage, it is probable that the transmission to man may often be direct.

The ova of the ankylostoma have been recorded present in the stools of 46 cases (on five occasions associated with other parasites). In the majority of these cases, the adult parasites have been found in the dejections after treatment with thymol. In addition, the adults and ova have been found in the intestine in eight cases at necropsy.

The patients with very mild infections may present no noticeable symptoms. With severe infections there has always been considerable anæmia. In one case of severe ankylostomiasis and concurrent typhoid infection, which later came to necropsy, the red-blood cells counted only 2,800,000, the hæmoglobin registered 40 per cent. and the white cells numbered 8,000.

The anæmia resembles clinically and in its blood-changes the usual changes seen in advanced, secondary, or chronic anæmias, with the exceptions that the leucocytes are sometimes relatively increased, the eosinophiles generally more numerous, and the percentage of hæmoglobin generally relatively lower. The parasite extracts the fresh blood through the mucosa, and the anæmia is generally in proportion to the number of parasites present in the intestine. It has been suggested, but not conclusively demonstrated, that the parasite excretes from its skin a toxic substance. Gastro-intestinal symptoms have been frequent. Diarrhea has not been an uncommon symptom; it may be intermittent. The temperature is often subnormal, though there may be slight fever at times.

Sections from the liver, in addition to the very advanced fatty degeneration of the cells, show grains of yellow pigment situated inside the liver cells, which give the chemical reactions of hæmatoidin. Daniels first noticed the occurrence of these granules and thought that they might represent the result of blood destruction within the vessels, due to some toxic substance produced by the parasite and absorbed from the intestine. To this he attributed the anæmia of ankylostomiasis. Rake, however, in 1894 concluded from a chemical estimate of the amount of iron found in the liver in five cases of ankylostomiasis that in this disease the iron contained in the liver is below the normal average, and that the anæmia is due to the direct abstraction of blood by the parasite. However, this yellow pigment may be often very abundant in the sections of the liver in cases of ankylostomiasis.

In none of our eight fatal cases infected with this parasite can the ankylostoma be said to be the sole cause of death, for at necropsy there have always been other lesions present. In two cases of severe ankylostomiasis the lesions of typhoid fever also existed. In neither of these would we have expected a fatal issue from the typhoid infection alone. In one, the temperature had almost reached normal. In both, at necropsy, there was advanced anæmia and fatty degeneration of the liver; in one the heart and kidneys were also fatty, and in the other marked cloudy swelling of these organs existed.

In the eight cases the liver showed fatty degeneration in six, the heart in two, and the kidneys in four. Cloudy swelling was present in the liver in two cases, in the heart in four, and in the kidneys in one.

The diseases the cases of ankylostomiasis were associated with were: Acute lobar pneumonia, 1; amœbic dysentery, 2; chronic parenchymatous nephritis, 1; amœbic abscess of the liver, no lesions of dysentery in the large intestine, 1; cancrum oris, æstivo-autumnal malarial fever, intestinal infection with *Strongyloides intestinalis*, 1; typhoid fever, 2. The infections with ankylostoma were severe and the ankylostoma were very numerous in five and moderate in three.

The parasites were found in the lower part of the duodenum, in the jejunum, and upper portion of the ileum. In all the cases there was intestinal catarrh, proportional to the number of nematodes found therein. In addition to the pallor and small amount of blood in all the organs and tissues, in the severe infections, effusions into the pericardium and abdominal cavity sometimes occurred.

An extract from one of our necropsy records, of a case of severe infection, reads as follows:

Small intestine: Beginning a short distance below the pyloris, the mucosa of the duodenum and of the jejunum is bathed in a considerable layer of mucus. In the lower half of the duodenum and upper two-thirds of the jejunum the mucus is much more abundant, reddish, and mixed with considerable blood. This bloody, mucous exudate is not only covering the mucosa, but considerable of it is lying free in the lumen of the bowel. On removing most of the exudate, the mucous membrane appears often uneven and occasionally distinct islands of more swollen mucosa, surrounded by depressed areas of a grayish color, may be seen. Many ecchymoses are present in and just beneath the mucosa and a few small pigmented patches also exist. Hanging to the wall of the duodenum and upper two-thirds of the jejunum are seen very large numbers (thousands) of the adult *Ankylostoma duodenale*. They are also present, but in much smaller numbers, in the lower end of the jejunum and upper portion of the ileum. Their heads are often buried in the mucosa. Many of them are fastened firmly to the intestinal wall and are not easily washed or brushed away. The bodies of a large number of the parasites are of a bright-red color and filled with blood. In some places the walls of the intestine are distinctly thickened, the mucosa being particularly affected. These regions of thickening correspond generally to those where the intestine contains the most bloody mucus, and to where the ankylostoma are apparently in greatest number. The large intestine, with the exception of the advanced pallor, appears normal.

The sections of the small intestine show the surface of the mucosa bathed in mucus and sometimes swollen. There are many torn villi, or here and there a villus and crypt of Lieberkühn have been destroyed. There is an extensive infiltration of the mucosa, muscularis, and upper portion of the submucosa. The infiltration consists of small round cells, eosinophiles, plasma cells, blood cells, and a variable, though smaller, number of polymorphonuclear leucocytes. With a low power, small red spots may be seen lying in the walls of the crypts of Lieberkühn. Upon examination with higher powers, these are seen to be clumps of eosinophiles, lying three or four together. A number of them show increased diameter and contain swollen, large, red granules, which appear somewhat vesicular. The eosinophiles show a marked increase in the mucosa; they are also increased in number, but less numerous in the upper portion of the submucosa. Tho ova of the ankylostoma are not seen in the tissues and there are no cysts containing the eggs, as seen in the sections of the intestine from cases of infection with the *Strongyloides intestinalis*. Only rarely is an ovum seen, then it is lying free on the surface of the mucosa. The segments of the egg stain a deep purple with hæmatoxylon, while the protoplasm about it and the shell remain perfectly clear and take no stain.

Portions of the adult ankylostoma may be seen cut transversely, lying near the mucosa, or with their heads buried in it. There are frequent small hemorrhages about them. Though in the sections studied no parasites have been found with their heads lying in the submucosa, there are evidences present that the parasite does travel this far, for there are breaks in the muscularis mucosæ and in some of these breaks a portion of the villus has been pushed into the upper portion of the submucosa. There are well-marked infiltrations of cells and small hemorrhages in these regions.

Many of the epithelial cells of the mucosa stain poorly and show cloudy swelling. A large number are swollen and contain large drops of mucin; there are also a number of droplets outside of the cells and lying within the crypts of Lieberkühn. Other cells show evidences of proliferation by the karyokinetic figures seen in their nuclei.

The diagnosis of ankylostomiasis may be made when the ova are found in the fæces.

In the treatment of the disease, thymol is the drug to be most recommended for ridding the patients of the parasite. There is some danger attending its use in the large doses sometimes required. General tonic treatment is often necessary during convalescence.

Cats here are not infrequently infected with the *Uncinaria trigonocephala.*

Strongyloides intestinalis.—This parasite was observed for the first time in North America by the author, in Baltimore, in December, 1897. A review of the literature and a report of the clinical symptoms and pathology of this case and other cases infected with the *Strongyloides intestinalis* was published in the Johns Hopkins Bulletin for 1901. More recent studies have shown that the parasite is not an uncommon one in Manila, we having met with 13 cases of infection with it.

The diagnosis of infection with this parasite may be made by finding the rhabditis forms in the stools. Here they measure from 0.25 to 0.60 millimeter long by 16 to 22 μ wide. In fresh stools they are very active, swimming both forward and backward with eel-like motions, quickly coiling themselves up or again straightening themselves out. They are often found intimately mixed with fæcal matter, which sometimes seems to closely adhere to them. They resemble the ankylostoma larvæ with the exception that they have at first a larger body.

Many of these larvæ, when placed in the stools in the incubator, after twenty-four hours begin to molt and to slip out of their skins; often the forms may be observed half out, and some just slipping out and casting off this outer covering. Their structure can now be more clearly made out. The cephalic extremity is rounded and pierced by the buccal orifice, where may be seen the suggestion of the lips. Following the mouth comes a vestibule, which in the embryo for a short distance undergoes a slight gradual enlargement, and then becomes slightly contracted. This is followed by a swelling or bulbous portion of the œsophagus, which is again narrower. This latter portion of the œsophagus is followed in turn by a second bulbous portion or stomach, which incloses an apparatus for trituration, composed of three chitinous teeth, placed in this form: $(\overset{\frown}{\mathrm{V}})$. The stomach is followed by the intestine, which ends in a teat situated at the right side of the animal just above the base of the tail; at times it protrudes slightly and particles are seen to pass from it. Situated on the right side, about one-third of the distance from the bulbous portion to the tip of the tail, may be seen a whitish, somewhat oval-shaped area, which represents the sexual rudiment. The tail is tapering and pointed. On each side of the body in the older forms may be seen, beginning at the bulb of the œsophagus, two longitudinal series of muscular plates placed very closely together. They can only be separated from one another by their nuclei. These embryos are found at necropsy throughout the intestinal tract.

Either one of three things happens to these rhabditis larvæ. They may die after three or four days, they may be transformed into filariform larvæ, or they may develop into the males or females of the adult free form.

Change to the filariform larvæ: The forms which begin to change to this generation have soon much longer and tapering tails, often rolled in a spiral manner. The parasite looks, therefore, thinner. They soon begin to resemble young filaria, to lose the rhabditis form, and to pass to the strongyloid form. The œsophagus loses its chitinous tooth as well as its swelling and first segment and becomes a cylinder which traverses the whole anterior half of the worm and then continues with the intestine. Their edges become slightly wavy. These forms grow no larger, but gradually their tails begin to shorten. If left in the stools, by the end of a week they all die; but if taken into the stomach of man in drinking water or on uncooked vegetables, salads, etc., they grow to the adult parasitic form of the *Strongyloides intestinalis*, which will now be considered.

The adult strongyloid form has the aspect somewhat of a filaria or of a strongyle. It represents the strongyloid form of the dimorphous species of this parasite. The adults are not found in the fæces, except after purges or anthelmintics, or when dead, but inhabit the duodenum or jejunum of man. They measure 2.10 or 2.20 millimeters long by 32 to 39 μ wide. The body increases slightly and gradually in size from the head to about the posterior fourth of the body. It terminates behind rather suddenly in a short tail; the tip of the tail is rounded and even a little dilated. The surface presents a fine regular striation. The mouth is simple and possesses no armature. Following the mouth comes the œsophagus, which is nearly cylindrical, and which occupies nearly a quarter of the length of the parasite and presents no enlargements or swellings. Next to the œsophagus comes the intestine, which could easily be confounded with it but for the change in its color. The intestine terminates itself at the base of the tail by an anus, which has the appearance of a transverse slit. The vulva opens at the posterior third of the body on the side; there is a slight protrusion and a transverse opening; the uterus also opens here in the adult. It incloses five or six eggs of a yellowish, granular appearance, ellipsoid, and measuring 59 by

34 μ. The eggs are often seen segmenting. These forms are apparently all females, yet it is still a question whether they are parthogenetic or whether they are true hermaphrodites.

The free eggs are also often seen in the human intestine. They are oval and resemble those of the ankylostoma, only they are a little larger, measuring from 60 to 70 μ by 37 to 39 μ. They are often joined together in strings of two or three. All stages of segmentation may be observed in the intestine, and the embryos may frequently be seen just issuing from their shells.

If the embryos found in the stools do not become filariform and change to the strongyloid form, they may, as has been stated, become, after forty-eight to seventy-two hours in the incubator, adult males or females of the free living generation. In this generation, when both males and females are present, there are from eight to ten times as many females as males present. The females are the larger and their bodies also taper more in the posterior portion. They measure, generally, from 1 to 1.4 millimeters in length, and from 0.05 to 0.075 millimeter in breadth. In the adult free living generation the œsophagus has the same form as that of the larva, only it has not lengthened itself so much comparatively, measuring now about 0.16 millimeter. Of the three portions of the œsophagus the buccalic is the longest; it measures 99 μ and represents in consequence a little more than one-half of the entire apparatus. The cephalic extremity is rounded and pierced by the mouth, about which one may see on careful examination three or four lips. Following the mouth comes a vestibule, which, for a short length presents a gradual enlargement. It enters the anterior extremity of the œsophagus which juts from its interior under the form of a smooth cone. The vestibule is much better developed than in the larvæ. Following this portion of the œsophagus comes the bulbous or terminal portion, inclosing an apparatus for dentition, consisting of three chitinous teeth in the form of a $\overset{\frown}{\mathrm{V}}$. The intestine of the female is also somewhat longer than that of the male; it ends, as in the larvæ, in a teat at the right side of the body at the base of the tail, and is often a little protruded. On each side of the body, running longitudinally, can sometimes be counted from 16 to 18 cells, which are closely placed, but which can be distinguished from one another by their nuclei. In the female the posterior extremity of the body stretches itself out into a thin, fine tail, often lightly coiled in a spiral. A little below the middle of the body, on the right side, the vulva opens, marked by a slight contraction and giving access to a double uterus, of which the horns extend, one anteriorly and one posteriorly; each of these is terminated by an ovary.

The eggs measure from 45 to 70 μ. They are elliptical, the shell is delicate and the vitellus contains few granules. The eggs are often segmented when laid, indeed they hatch not infrequently in the body of the mother.

The adult free males differ in the following respects from the females. They are shorter and thinner, measuring from about 0.75 to 1 millimeter long by 0.04 to 0.06 millimeter wide. The œsophagus is also a little shorter than that of the female. The caudal extremity measures about 70 μ; it tapers quickly and is curved on itself in a manner quite different from the spiral coils of the tail of the female. Just at the base of the tail one may see clearly two spicules, cone shaped and curved, which represent the penis. In front of the cloaca on the ventral side are two or three small papillæ. The adult forms copulate, and from the eggs of the female the embryos hatch usually within twenty-four hours. The resulting embryos are thin and their tails tapering. They show at first the bulbous swelling of the œsophagus and the chitinous teeth. They soon lose these structures, however, and become more like filaria; that is, they change from the rhabditis to the strongyloid form. If they are now taken into the stomach of man they may grow to form the adult female parasitic strongyloid form; otherwise they soon die. Thus it may be seen that the first and second generation may be quite different morphologically from one another. For this reason they were supposed for a long time to represent two distinct parasites and were described under the names of *Anguillula stercoralis* and *A. intestinalis.* It seems that only the latter is parasitic, and that the former perhaps merely serves to perpetuate the species more effectively.

Microscopical study of sections of the small intestine, cut from the duodenum and upper portion of the jejunum, show in general a catarrhal inflammation with desquamation, and in many places atrophy of the epithelial cells. The solitary follicles are often slightly swollen, and there are often infiltrations of small round cells about the glands. There is usually a moderate increase in the eosinophiles in the tissues which contain the parasites and ova. In sections stained with Unna's alkaline blue, only a few plasma cells may be seen.

The sections show in addition, first, many eggs in various stages of segmentation, some containing embryos, generally lying in the bottom of the crypts of Lieberkühn. In these crypts the epithelium is much compressed and often atrophied. The nuclei lie at the base of the cell, and about them usually no cell substance can be made out. Some crypts contain as many as two eggs. The epithelial cells then seem considerably compressed and atrophied. About these crypts which contain eggs (particularly when they are segmenting or contain embryos not yet hatched) there are a few round cells. The diameter of the crypts containing eggs or parasites is always considerably larger than the surrounding crypts without parasites. In sections where the egg has burst and the embryo escaped, the epithelium of one side of the crypt has disappeared. About these crypts there are some evidences of proliferation, as evidenced by the karyokinetic figures of the nuclei of the surrounding cells, and the same compression and atrophy of the epithelial cells, with infiltration of round cells about them, exist. In other crypts, the egg rests on the basement membrane of the gland. The epithelium is then either gone entirely or is also much compressed. Not infrequently what appear as small cysts (in transverse sections) are seen lying in the walls of the crypts, resting on the basement membrane. Apparently the eggs have disappeared from these cysts, leaving clear areas. There is no evident infiltration with small round cells about them. Secondly, pieces of the adult female cut longitudinally and transversely, lying in the lumen of the crypt or down beneath the epithelium of the crypt or villus and resting on the connective tissue, which lies between the muscularis mucosa and the blind end of the glands. There are usually infiltrations of small round cells about the parasites, and karyokinetic figures may also sometimes be seen about them, together with round, oval, and spindle-shaped cells. In sections which contain the adult in or near the mucosa, the desquamation of the cells may be marked and many of the neighboring nuclei stain poorly. Thirdly, many of the crypts contain embryos. These crypts show the same flattening and atrophy of the epithelial cells. In some places the cells are entirely absent from the crypt, and at first sight it may appear that the embryos are in the lymph spaces. The sections show sometimes the embryos breaking through the crypts or lying between the epithelium of the villus. There are usually desquamating cells lying about them.

In 1895 and 1896, B. Tessier stated that he believed the *Anguillula stercoralis* gave birth to small embryos which penetrated through the intestinal wall through the breaks in the mucosa and appeared in the circulating blood. He was led to take this view because in a patient which he observed he found the embryos of the *Strongyloides intestinalis* in the stools, and filarial-like embryos in the circulating blood. He concluded that the parasite was hence a facultative hæmatozoön. In careful and repeated examinations of the blood, in our cases of infection with the *Strongyloides intestinalis*, we have never found the embryos in the circulating blood. It is not clear that Tessier's case was not one of combined infection with a variety of filaria and the *Strongyloides intestinalis* and we are inclined to take this view of it.

Our patients all showed diarrhea, which was sometimes moderate and generally intermittent in character; they also in addition often suffered from gastro-intestinal disturbances. There was usually moderate anæmia present. The leucocytes were generally normal or slightly increased in number. Differential counts showed about normal proportions of the leucocytes; the eosinophiles did not number over 2 or 3 per cent.

We have never yet found this parasite in a well individual.

From the clinical study, and particularly from the histological study, of sections of the small intestines from cases infected with this nematode, we can not conclude that the parasite is harmless, while on the other hand it is not a particularly dangerous one to man. We believe it to be capable of causing clinically an intermittent diarrhea with intestinal disturbances, and anatomically a catarrh of the small intestine. It seems quite certain that the parasite, from the positions it occupies in the mucosa and from the changes about the ova, embryos and adults lying in the tissues, may cause particular changes by its rapid mechanical movements. Moderately severe infections probably cause only slight disturbances.

As has been stated, the diagnosis rests upon the presence of the rhabditis embryos in the stools. The eggs and adult females, except after treatment, are generally not found there. In ankylostomiasis, the ova are always present in the stools, and thus the two affections may be easily differentiated.

Treatment.—The milder cases of infection sometimes yield to large doses of thymol, together with purgatives and general tonic treatment. It is often necessary to repeat the treatment at intervals. In very severe infections, neither male fern nor thymol is of any apparent value in ridding the patient of the parasite.

The parasite has also been found here in the small intestine of monkeys, producing apparently the same changes as seen in man.

In perfectly healthy monkeys not previously infected with this parasite, however, we have recently been able to produce successful inoculations by introducing stools containing the embryos of the *Strongyloides intestinalis* into their stomachs.

The monkeys were fed through a stomach tube with a portion of a stool containing the embryos. The diarrhea was generally noticeable after about a week following the inoculation. The only difference of moment noted between the diarrhea in the monkey and in man is in the fact that in the latter the ova are usually found in large numbers in the fæces. These experiments have settled definitely that the parasite is both capable of producing diarrhea and of bringing about pathological changes in the small intestine.

DIPTERA.

Seven cases of myiosis interna have been observed. The dipterous larvæ have been passed in these cases in the perfectly fresh fæces. The larvæ observed have been those of the *Calliphora vomitora* (blue-bottle fly), and more rarely of *Anthomyia canicularis* (flower fly).

The latter was found in one case in the fæces of a newspaper reporter who had accompanied our troops on a long march. He had not been particular about his diet, having at times eaten native food.

The symptoms observed in these cases were moderate diarrhea and occasionally gastric or intestinal pains.

The diptera in the fæces may be easily seen with the naked eye. They measure from 2 to 2½ centimeters in length. Their diameter increases from the anterior or head end downward, so that at the posterior end they are quite broad. Their cylindrical bodies are ringed with generally about ten ribs.

They are apparently easily expelled with ordinary purgatives.

The cases of infection with *Calliphora vomitora* probably occur from eating meat upon which the ova of these flies have been deposited.

The cases of *Anthomyia canicularis* infection probably occur from the vegetable material of food infected with their ova.

HIRUDINES.

Our soldiers on the march, particularly along the bases of the mountains in the wooded districts, have been troubled considerably at times with leeches.

These parasites measure, before being filled with blood, about 2 centimeters in length and about 4 or 5 millimeters in thickness. They apparently cling to the branches of the trees or lie in the grass, and fasten themselves on the individuals as they pass. The ankles have been their most common place of attack; the parasite apparently working in at the shoe-laces. In several cases they have entered the eye and fastened themselves beneath the lid, causing considerable pain and anxiety.

TREMATODES.

Paragonimus westermanii.—Opportunity is here taken to call attention to the fact that this parasite, which has been found in China and Japan and more recently in America, has lately been intimated by American writers to also occur in the Philippines. Although we have sought for it in this laboratory, we have not observed it here, and, so far as I know, the parasite has not been found in these islands. A word on its description may, however, not be out of place. The following account is mainly from that given by Stiles and Hassall in their recent article on this subject:

"The parasite has been found in the tiger, dog, hog, cat, and man, and seems to be identical in these animals. Its life history is still obscure. The fluke measures 16 millimeters long, 4 to 8 millimeters broad, and 2 to 5 millimeters thick. It is found encysted in the lungs. The eggs do not apparently develop until they leave their host by means of the sputum. Among the symptoms produced by this parasite, cough and spitting of blood are common. The sputum may resemble that of pneumonia between the attacks of hæmoptysis. Probably the disease is sometimes confounded with tuberculosis. The correct diagnosis may be made, however, by finding the ova in the sputum. The eggs are oval, with even borders, and possess a double outline. They measure from 80 to 100μ in length and from 40 to 60μ in breadth.

"Though the parasite is usually found in the lungs, it may at times locate itself in the brain, when attacks of epilepsy of the Jacksonian type may result. In other instances the liver and other organs may be invaded."

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.—CIRCULAR No. 3.

BUBONIC PLAGUE.

Plague is an acute, infectious disease, running a rapid, severe course, and usually terminating fatally. It generally is characterized by buboes, high fever, severe general symptoms, and is frequently accompanied by subcutaneous hemorrhages, pustules, and carbuncles.

History.—From earliest times, writers have described epidemics of plague. Their descriptions are, however, too vague to permit of a diagnostication of the disease now known as bubonic plague, since the word "plague" was used to designate any highly fatal epidemic.

Egypt seems to have been the starting point for many of these ancient epidemics, which are first accurately described by Rufus of Ephesus, in the first century A. D. From his writings it is ascertained that the first carefully described epidemic occurred about the end of the third and the beginning of the second century B. C. This epidemic extended throughout Libya, Egypt, and Syria. From this time until the Justinian age numerous indefinite descriptions of bubonic plague have been given.

About 542 A. D. a second accurately described epidemic started in lower Egypt, especially in Pelusium, gradually extending thence along the north coast of Egypt to Palestine, Syria, and finally to Europe. The disease was present throughout Europe during the following half century. From this period to the fourteenth century A. D., Europe was visited by numerous epidemics, but again the descriptions are too vague for identification with plague.

A second severe epidemic raged throughout Europe during the fourteenth century, with an estimated death-roll of 25,000,000 of people. The disease was, moreover, continually here during the following three centuries, its severity gradually diminishing and the epidemics becoming more widely separated. The last occurred in Constantinople in 1841, but as late as 1878 a small endemic is recorded in the Russian-governed province of Astrakhan. Lower Egypt was the epidemic home for bubonic plague in Africa, as was Turkey in Europe, and Syria in Asia.

Epidemic centers of plague have extented into western Asia, whence it has spread to practically all of the Oriental ports, Oporto, and South America.

The history of plague shows that as civilization improved social and hygienic conditions, plague sought its more congenial surroundings amid the filth of the ignorant.

Etiology.—Plague is produced by the bacillus *Pestis bubonicæ*, first discovered by Kitasato. This bacillus is a short, round-end, encapsulated organism. As seen in smears from the blood and glands, it appears singly, in pairs end to end, and in chains of three or four. It varies in length from 1 to 1.8 μ, and in width from 0.4 to 0.7 μ. The size and contour of the bacilli vary greatly, these being determined to some extent by the culture media upon which they grow. Organisms found in the blood are frequently much larger and plumper than those found in the glands, and may often appear as very large cocci. The capsule varies greatly in size, but is usually about twice as wide as the bacillus. The organism is rarely seen in a cell. It stains by all the aniline dyes, and quickly decolorizes by Gram's method of staining. When lightly stained with Loeffler's alkaline methylene-blue, the organism frequently takes a bipolar stain, appearing very much like a diplococcus. If a smear is first stained by Gram's method, and afterwards lightly stained with methylene blue or carbol-fuchsin, a beautiful bipolar stain may be made.

The organism grows well in all the ordinary media. Twenty-four-hour-old colonies are small, round, even-edged, and almost transparent, with the center slightly milky. Under the microscope the colony is granular, slightly yellowish and darker in the center than about the edges. The edge is wavy, or more or less indented. At forty-eight hours the colony is somewhat larger, more opaque, and of a milky color.

On neutral plain agar-agar, at the end of twenty-four hours, a faint, translucent, slightly milky colored growth is observed. The growing edges are smooth and thicker than the central portion of the streak. The water of condensation is slightly turbid, with a slight whitish sediment at the bottom. At the end of forty-eight hours the streak is considerably larger than at twenty-four, slightly more opaque, and the edges are somewhat scalloped. No further important changes are noted in older cultures. When a portion of the culture is removed by a platinum wire a glutinous consistency is observed, the growth usually pulling out into long threads.

On blood serum a similar growth is seen, but slightly more opaque. No change in the media is noted.

On glycerine agar the growth is not so abundant as on plain agar.

On acid potato the growth is sparse, slightly moist, and of a very faint yellow color. No change on the potato is noted.

In bouillon the most typical growth is seen. The organism grows just under the surface of the bouillon, and on the sides of the tube. From the surface of the bouillon the growth projects downward in light, flocculent masses, which, on the slightest shaking, settle to the bottom. The bouillon remains clear.

No change is produced in litmus milk.

In litmus glucose agar-agar a slight reddening appears, which gradually extends through the entire media.

In glucose agar-agar stabs the growth continues along the entire stab, having a whitish opaque appearance, and extending but slightly into the media. No gas is produced.

In peptone solution no indol is formed.

The organism from cultures does not, as a rule, take the bipolar stain, and the capsule, if present at all, is very much diminished in size. The organisms from the several media take all of the aniline stains, and rapidly decolorize by Gram's method of staining. On hanging drop, the organism has an active Brownian motion, but is not motile.

The diagnosis of plague bacillus in culture media is determined as follows: It decolorizes by Gram's method; produces no gas in glucose agar-agar; produces no change in milk; is non-motile; produces no indol; has the characters of growth as described for bouillon; is pathogenic for white mice, house rats, guinea-pigs, rabbits, monkeys, and all domestic animals.

The plague organism is long lived. From sterile paper, inoculated with a pure culture and kept in a dark place, the organism has been recovered after forty-five days. Sunlight destroys it within three hours. The bacillus is easily killed by the ordinary disinfectants, and is very susceptible to heat.

About a point of inoculation a local inflammatory swelling appears, with considerable œdema, induration, and hemorrhage. The nearest lymphatic glands are enormously swollen, hyperæmic, or hemorrhagic and œdematous. All of the lymphatic glands of the body are enlarged and hyperæmic. The spleen is enlarged, hard, and of a bright-red color, the anatomical structures being easily seen. Numerous hemorrhages may appear throughout the body. A more or less marked septicæmia is noted. The animals die, as a rule, in from thirty hours to four or five days, usually from fifty to seventy hours. The duration of the disease does not seem to depend on the dose of the organism.

General pathological conditions.—The body is usually not emaciated, and the subcutaneous fat is normal in color. Rigor mortis is usually early and well developed. Ordinarily the onset of putrification is delayed, except in secondary infections. General emphysema of the skin has been noted. The venous system is usually congested, and all of the organs are more or less hyperæmic or hemorrhagic. Parenchymatous and fatty degenerations are general. After the disease has become systemic, the bacilli are found throughout the body.

Skin.—The skin is usually dry and hot. Occasional outbreaks of perspiration may be noted; this is especially true in the pneumonic type. Some observers speak of an odor peculiar to plague. General œdema of the skin is not common, but may appear in cases complicated with nephritis. The appearance of hemorrhages in and under the skin varies greatly in different epidemics, and even in the same epidemic. In epidemics occurring during the fourteenth century, cutaneous and subcutaneous hemorrhages were common, giving rise to the name "Black Death." Hemorrhages may be divided into two classes, namely, the punctate hemorrhages into the deep layer of the skin, and the diffuse and often extensive hemorrrhages into the subcutaneous tissues. The small punctate hemorrhages vary in size from a pin-point to one-half of a centimeter in diameter. They usually appear a few hours before death over the face and trunk, especially about the shoulders and on the extremities. Their outline is sharp, and no change in the skin is noted. They vary in color from bright red to almost black. The diffuse subcutaneous hemorrhages appear toward the end of the disease over the face, trunk, and upper extremities. They vary in size from one-half centimeter in diameter to an area of 3 or 4 by 6 or 8 centimeters, and resemble a bruise. The hemorrhagic tissue teems with bacilli. The skin about old scratches, insect bites, etc., is usually hyperæmic.

Writers of all ages have mentioned the occurrence of exanthematous eruptions. Under this title many lesions were included. During recent epidemics numerous observers have described such exanthematous eruptions. Roseolar spots have also seen noted. In several cases occurring in Manila wheals have been observed. Herpes is most unusual in plague and has never been observed in plague-pneumonia.

Lymphangitis rarely occurs in plague. When found, it is usually associated with a primary carbuncle or bubo. Occasionally it occurs without apparent connection with either. When present, the surrounding tissues are hard, indurated, the skin is reddened, and there is more or less pain. In the event of a favorable termination he lymphangitis gradually subsides.

The pest carbuncle begins with a bluish-black colored spot, similar to a subcutaneous hemorrhage. Within a few hours or a day one or more small vesicles appear, which latter form one vesicle filled with a slightly bloody fluid. The fluid in the esicle may contain a pure or mixed culture of the plague bacillus. Within a short ime the vesicle ruptures, leaving a reddened, granulated surface, which is soon covred with a reddish-brown dry scab. The edges are more or less indurated, sharply efined, elevated above the center of the ulcer, and surrounded by a varying, ill-defined hyperæmic area of skin. Œdema accompanying the carbuncle may be very extensive. Associated with the carbuncle may be more or less lymphangitis. The size of the carbuncle varies from one-half to 5 or 6 centimeters in diameter. The superficial ulcer may spread rapidly after the vesicle is ruptured. This class of carbuncles is usually called primary. Some authors consider the primary carbuncle as a portal of entry. This is exceptional, as the portal of entry does not usually undergo an inflammatory process. Within two days after the development of the carbuncle the glands begin to enlarge and the fever develops. Carbuncles associated with the buboes occur later during the course of the disease. They are probably metastatic, and correspond to the second-order buboes. Carbuncles have no relationship to the severity of the attack.

During the course of the disease superficial vesicles may develop. These vesicles are formed by the accumulation of a bloody fluid under the epidermis, the base showing no inflammation, and the fluid usually containing the plague bacilli.

Muscles.—The muscles are usually of a dark color and dry. About the bubo more or less hemorrhage may be noted. The œdema accompanying the primary bubo of the first order rarely affects the muscles.

Bones.—The periosteum is injected, especially about the bubo. The bone marrow is normal, or slightly hyperæmic.

Lymphatic glands.—The lymphatic glands seem to be the elective seat of development for the plague bacilli. From the symptoms and the pathological manifestations of the disease it is learned that the glands always play an important, if not the most important, rôle. This is due to the general lodgment of plague bacilli in them.

The pathological condition of, and the relationship between, the lymphatic glands will first be considered, as a knowledge of the process at work in this system is essential to the proper understanding of the disease.

For convenience of description the nomenclature of Albrecht and Cohn will be used: The gland showing the most pathological changes, usually the first gland infected, is called a primary bubo of the first order; glands belonging to the same chain or group of glands as the primary bubo of the first order, and infected by the passage of bacilli through the lymphatic vessels, are called primary buboes of the second order; glands in distant portions of the body, infected through the blood supply, are called secondary buboes.

PRIMARY BUBOES OF THE FIRST ORDER.

Lesions of primary buboes of the first order may be divided into (1) those involving tissues around the bubo, and (2) those affecting the bubo proper. The degree of pathological change associated with primary buboes of the first order naturally varies with the severity and duration of the disease. The distinction between a primary bubo of the first order and one of the second is more relative than absolute. The difference found may be explained, to a great extent, by the difference in time of the infection of the respective buboes. There are, however, two important distinctions, which are easily made out, namely, œdema, and periglandular induration, which are characteristic for a primary bubo of the first order.

The skin covering a primary bubo of the first order is usually slightly reddened, and may present, in the immediate neighborhood, either pustules or carbuncles. In the early stages of the disease, the skin is freely movable over the bubo, but as the bubo enlarges and the periglandular infiltration increases, this mobility is lost. Varying degrees of œdema, depending on the amount of œdema accompanying the bubo, are noted in the skin. The œdema associated with a primary bubo of the first order is absolutely typical. The amount is very varied, ranging from a slight serous exudation into the tissues between the muscles, to an extensive exudation, involving all the surrounding tissues, and even extending to distant portions of the body. The œdema accompanying the femora bubo may be general from the knee to the thorax, and of the retroperitoneal tissue of the affected side, as far as the diaphragm. It is not uncommon for it to extend beyond the median line. When œdema is extensive, the natural grooves and contour of the affected part are, of course, destroyed. Cut sections through the œdematous tissues show a slight straw-colored, gelatinous consistency of the structures, from which a thin, light, straw-colored fluid slowly escapes. The blood vessels are enormously distended and punctate hemorrhages are frequently noted. The lymphatic vessels near the glands are also distended. Microscopical examination of the escaping fluid shows varying numbers of leucocytes, red blood cells and bacilli. This œdematous region is usually the last location suffering from secondary infection, and after death frequently pure cultures of the plague organism may be obtained here, when in all other portions of the body mixed cultures are found.

The tissues immediately surrounding these buboes are infiltrated with small, round cells and some leucocytes, and present varying degrees of hemorrhage. The infiltration appears generally from 24 to 48 hours after the bubo begins to develop, and naturally limits the mobility of the gland. When the primary bubo is one of a group of glands, the infiltration obliterates the outlines of the individual glands, making one solid, immovable mass. The accompanying hemorrhages vary greatly in degree, ranging from a condition of extreme congestion to massive hemorrhages.

The primary bubo may vary greatly in size, ranging from a normal-sized hyperæmic gland to a bubo as large as a hen's egg. In rapidly fatal cases, death occurs before the glands have time to enlarge. In these cases septicæmia develops early; the glands may be slightly enlarged, hyperæmic, or more or less hemorrhagic, and œdematous, the surrounding tissues being œdematous or hemorrhagic. The œdema and periglandular infiltration of the surrounding tissues may be absent. When a bubo is well developed the gland is usually hard, and the cut section shows the capsule stretched, more or less hemorrhagic, and infiltrated. The cut surface of the glands bulges, is œdematous, more or less hyperæmic, and hemorrhagic. Portions of the glands not hemorrhagic or intensely hyperæmic are usually of a grayish color, with a faint yellowish tinge. Hemorrhages may be located in the cortex or extend throughout the entire gland. Oftentimes they follow the lymph sinuses. The center of the gland is usually soft, but pus is rarely found, except late in the disease. Microscopically a general coagulative necrosis, leucocytes, red blood cells, and masses of bacteria are seen in addition to the normal elements of the glands. Considerable fatty degeneration is usually present, especially near the center of the gland. Proliferation of the endothelial cells lining the lymph sinuses is seen in the earlier stages of the processes. With the hæmatoxylin and eosin stains the bacteria appear as faint blue masses.

PRIMARY BUBOES OF THE SECOND ORDER.

As stated above, these buboes belong to the same chain or group of glands as the primary bubo of the first order, and receive their infection from the first-order buboes through the lymphatic vessels. As a rule, the second-order buboes are not as large as the first, and are never surrounded by the œdema and periglandular infiltration, except when immediately associated with first-order buboes. The glands are usually freely movable, hard, and surrounded by more or less hemorrhagic tissue. The capsule is distended, and on cut section the gland substance bulges, is œdematous, hyperæmic, more or less hemorrhagic and soft in the center. The substance of the gland when not entirely hemorrhagic or hyperæmic is of a grayish color. Rarely is pus seen. Histologically, the first pathological changes are noted in the lymph sinuses, where may be seen a proliferation of the endothelial cells lining the sinuses, lymphocytes, leucocytes, red blood cells, and bacteria. More or less coagulative necrosis is seen along the course of the sinuses. The process rapidly extends throughout the glands, producing a picture similar, but less in extent, to the primary bubo of the first order.

SECONDARY BUBOES.

As before stated, the secondary buboes are those infected through the blood supply, and may include all of the remaining glands of the body. They are small, freely movable, œdematous, hyperæmic, and occasionally hemorrhagic. Histologically the glands show œdema, hyperæmia, and a necrosis of the elements in the center of the lymph follicles.

FREQUENCY AND LOCATION OF BUBOES.

In the greater proportion of cases of bubonic plague buboes are found. Russel records their presence 2,641 times in 2,700 cases, or 97.8 per cent; Wilm, in Hongkong, found 73 per cent. The percentage naturally varies in different epidemics.

All observers have found the femoral and inguinal buboes most common, the axillary next in frequency, and the cervical least often. Russel gives the following percentages:

Inguinal buboes, including femoral	per cent..	69. 70
Axillary buboes	do....	21. 54
Cervical buboes	do....	8. 76

The following percentages in the sexes are given:

Inguinal and femoral buboes:		
Male	per cent..	45. 35
Female	do....	34. 81
Children	do....	19. 84

Axillary buboes:		
Male	per cent	36.20
Female	do	31.63
Children	do	32.17
Cervical buboes:		
Male	do	25.10
Female	do	24.67
Children	do	50.23

These percentages closely agree with those given by other observers.

SPECIAL BUBOES.

A femoral bubo, when well developed, stands out prominently, and the œdema of the surrounding tissues is easily visible. The gland is hard, but the surrounding œdema may give a semi-fluctuating sensation. The inguinal glands may or may not be infected, as a group; frequently only one gland is enlarged. One or more, or all, of the iliacs, lumbar and pelvic glands of the same side may be affected. The œdema accompanying the femoral bubo may extend through the retroperitoneal tissue of the same side. The secondary buboes may be individually surrounded by hemorrhagic tissues, or the entire retroperitoneal tissue may be one mass of hemorrhagic tissue. The same process may extend into the pelvis. The involvement of the lumbar glands may cause a back flow of lymph in the side opposite the primary bubo of the first order, causing second order buboes. With a femoral primary bubo of the first order we may have primary buboes of the second order, involving the inguinal and iliacs of both sides, or the lumbar and femoral of the opposite side. Other glands involved would be secondary buboes.

An inguinal primary bubo of the first order gives more or less the same picture. In this case the femoral of the same side, the iliacs of both sides, the inguinal and femoral of the opposite side, and the lumbars, would be second order buboes. The remaining glands enlarged would be secondary buboes.

The axillary primary bubo of the first order presents the same œdema, etc., as above described. The remaining glands of the axilla and the chain extending along the vessels into the thorax, are the second order buboes, and may present the varying degrees of hemorrhage. The back flow of lymph may carry the infection to the glands of the neck and to the opposite side of the body.

The cervical primary bubo of the first order has the same characteristics. The cervical glands along the vessels are the second order buboes, while the back flow of lymph may carry the infection to the axilla of the same side, and to the opposite side of the neck. All involved glands not mentioned are secondary buboes.

In a small percentage of cases primary buboes of the first order are noted in widely separated regions, such as the axilla and groin of opposite sides, or cervical region and groin, or axilla and groin of same side. In these a double infection has probably taken place.

DEVELOPMENT OF BUBOES.

Buboes of the first order usually appear from the second to the fourth day of the disease; in some cases, however, the glands begin to enlarge with onset; while in others indefinite pains may be experienced at the site of the future bubo, before the development of the usual first symptoms. The development of the bubo is usually rapid, reaching its height from the sixth to the tenth day. In the greater proportions of cases death occurs before suppuration. Suppuration comes on during the second week of the disease, and is usually caused by organisms other than the plague bacillus. In a small percentage of the favorable cases suppuration does not take place. In these cases resolution occurs. Pain is usually most intense, causing the patient to assume any position which serves best to reduce pressure on the bubo of the surrounding parts and clothing. Often the pain is too severe to allow of palpation. When the active processes reach their limit pain usually subsides, to reappear when suppuration begins. When opened after suppuration, the bubo is frequently very slow in healing and, in some cases, gangrene may develop. These sequelæ are due to the general lowered vitality of the patient.

The second-order buboes appear shortly after the first order; in some cases the two classes seem to develop at the same time. When the first-order bubo is one of a group of glands it is often difficult to determine which is the first and which the second-order bubo. In the early stages of the disease the individual glands can be made out, but later they form one mass of immovable tissue. The pain accompanying the second-order bubo is, as a rule, not so severe as that accompanying the first order. The fate of the second-order bubo is similar to that of the first order. In favorable cases second-order buboes, located within the abdomen, may suppurate, giving rise to serious complications.

Secondary buboes, as a rule, do not develop until the disease becomes general, or until septicæmia occurs. The toxins circulating in the blood may cause some general glandular enlargement. More or less pain is associated with the secondary buboes, but never equal to that of the first or second order.

Respiratory tract.—The nasal mucous membrane shows nothing, except occasional hemorrhages. Varying degrees of congestion and œdema are seen in the larynx. The mucous membrane of the trachea may be more or less injected and sometimes shows true inflammation. The lungs are more or less œdematous and congested, while varying degrees of bronchitis or broncho-pneumonia may be present. The pleura often shows punctate hemorrhages, both in the parietal and visceral layers; pleural hydrops may occur, especially late in the course of the disease. The glands at the base of the lungs are usually enlarged, and more or less hyperæmic. The mediastinal glands are enlarged, more or less hyperæmic and hemorrhagic.

Circulatory apparatus.—During life, the heart is one of the first organs to show the effects of the toxins circulating in the blood. From the beginning of the attack it is more or less dilated, its action usually weak, and frequently a systolic murmur is heard.

The pulse ordinarily runs from 90 to 100 beats per minute. Frequently, however, the rate increases to 180, or even 200 beats. In the beginning of the attack, the pulse is usually full, fairly strong, resembling the ordinary fever pulse. Within a short time, however, it becomes weakened, oftentimes dicrotic, small, and easily compressed.

The vessels of the pericardial sac are usually congested, occasionally showing a few hemorrhages. The sac contains more or less light-colored fluid. The heart is usually distended, and the superficial vessels engorged. Frequently numerous subpericardial extensive hemorrhages are noticed, especially over the left auricle and venticle. The muscles are flabby, soft, more or less cloudy, and often show fatty degeneration. The valves and endocardium are usually unaffected, except for an occasional subendocardial hemorrhage. Histologically, the heart muscles show more or less parenchymatous change, with varying degrees of fatty degeneration. The vessels are congested, frequently containing a large number of leucocytes. Some red blood cells may be scattered throughout the tissues.

The arteries are usually not affected. In the neighborhood of buboes, hemorrhages may be noted into their outer coats. The veins about the buboes are usually studded with hemorrhages, which involve the entire wall. The induration about the bubo may include the veins. In these locations a favorable opportunity is offered the bacilli to enter the general circulation.

Alimentary canal.—The mucous membrane of the mouth is usually dry, more or less congested, hemorrhagic, and the lymphoid structures may be slightly swollen. The tongue is usually swollen, œdematous, and heavily coated white. As the disease progresses, the coat may become of a reddish-brown color, especially along the middle. The papillæ are usually prominent and congested. The salivary glands are rarely affected, except in cases of cervical primary buboes. The tonsils may be enlarged, hyperæmic, and even necrotic. The pharynx is usually congested. The œsophagus is not affected.

The mucous membrane of the stomach is usually covered with a dirty, brown, mucoid material, which contains more or less blood. Frequently it is studded with punctate hemorrhages, which may sometimes involve the entire wall. The lymphatic structures may be swollen. The mucous membrane of the intestines is usually more or less hyperæmic, and frequently presents, especially in the duodenum, numerous punctate hemorrhages. The lymphatic structures are usually more or less swollen and hyperæmic. The entire gut may be more or less bile stained. The mesenteric glands are usually enlarged, hyperæmic, and may be hemorrhagic. About the cœcum, the group of glands is occasionally palpable.

The saliva in ordinary cases presents nothing of interest. It contains the plague bacilli when the disease has become general. In pneumonic cases the saliva may become increased and contain more or less blood and bacilli.

Diarrhœa or constipation may occur. The bacilli may be present in the dejecta. More or less pain throughout the abdomen may be present, due, doubtless, to the enlarged mesentery glands. Frequently when the pain is located about the cœcum, and when the tumor mass above referred to is palpable, especially in the absence of the other symptoms of plague, it may be difficult to differentiate it from acute appendicitis. Pain in the epigastrium is common, and is often associated with nausea and vomiting.

Peritoneum.—The peritoneum is usually dry and the vessels congested. In some cases a varying amount of straw-colored fluid is present. Occasionally, patches of peritonitis are seen over an iliac bubo.

Spleen.—The size of the spleen in well-marked plague cases varies from normal to three or four times original size, and may or may not be palpable during life. A typical plague spleen is firm, capsule tense, pulp substances increased, of a bright brick-red color, with more or less hemorrhages about the malpighian bodies or into the pulp substance, and œdematous. The trabeculæ are usually prominent. The diffluent spleen is not seen in plague except in mixed infections. Microscopically, the tissues are widely separated, with the small cells and the polymorphonuclear leucocytes increased, and desquamation of the endothelial cells lining the spaces. Varying degrees of hemorrhages may be noted throughout the tissues, especially about the malpighian bodies. The fixed elements usually show a cloudy protoplasm, with more or less fatty degeneration, and a diminished amount of nuclear material.

Liver.—The liver is usually somewhat increased in volume and congested. The surface may present many or few hemorrhagic areas about the longitudinal ligament and areas of fatty degeneration. Cut section shows degeneration, varying degrees of cloudiness, and a more or less bile-stained condition of the organ. Microscopically, parenchymatous and fatty degeneration are apparent. The nuclei stain faintly or not at all. The vessels are more or less distended.

Urinary system.—The kidneys often present marked hemorrhages into the capsule throughout the organ and in the pelvis. Parenchymatous and fatty degeneration and varying degrees of congestion occur. The ureters are not affected, nor is the bladder, except occasionally punctate hemorrhages may be noted in its mucous membrane. Cystitis has been observed.

The urine presents the ordinary changes seen in acute infectious diseases. Occasionally, from the third to the fourth day, a large amount of albumen, hyaline casts, and red blood cells are seen. Accompanying these changes in the urine may be more or less œdema of the subcutaneous tissues.

Generative organs.—Ordinarily no lesions are noted in the male generative organs. The German Plague Commission recorded one case of primary carbuncle on the penis. Œdema of the scrotum may be associated with femoral and inguinal primary buboes of the first order. The female organs of generation are rarely affected, though some œdema of the labia may occur. Hemorrhage from the uterus is not uncommon. In pregnant patients, abortion is usual; the child may or may not be dead.

Nervous system.—The membranes of the brain and cord are more or less injected, hemorrhagic, and œdematous. A few cases of plague meningitides have been observed. The brain and cord may be congested and œdematus. The ventricles usually contain an increased amount of fluid, and the choroid plexuses are hyperæmic. Throughout the body more or less hemorrhage may be noted in the sheaths of the nerves.

The derangements of the nervous system depend more upon toxic influence than upon direct pathological change. Usually during the prodromal stage of the disease no derangements are seen. When observed, they are similar to those of other infectious diseases: Weakness, indefinite feelings of sickness, dizziness, loss of appetite, headache, general pains throughout the body, etc. During the early stages, headaches and dizziness are common. Headache is usually severe and may be of the occipital or frontal type, or pain may extend throughout the whole head. Headache may continue through the entire course of the disease, presenting one of the most difficult symptoms for treatment, or it may be temporary or periodical. It usually disappears when the convalescent stage begins. Dizziness may be well marked, and may vary in a manner similar to the headache. When present it may cause the patient to have a drunken gait.

The condition of the general sensorium varies greatly in different cases. General weakness is usually noticed at the onset of the disease, and all degrees of the typhoid state, to complete coma, may be observed. These conditions may develop at any time during the course of the disease, and may be as well marked at the onset as later. General prostration is usually well marked. Frequently the patient is so weak as to be scarcely able to answer questions or to move about in bed. Often when in this condition the patient passes into a dreamy state, which may be only temporary, or which may gradually increase until complete coma results. Coma may develop at any stage of the disease, and be of a transitory nature, but more usually it continues until death. Delirium may develop at any time, and apparently does not depend upon the degree of the fever or of the severity of the attack. Practically all types of delirium may be noted during an epidemic, from the simplest illusions to the most violent motor disturbances. Subsultus tendinum, spasm, convulsions, stiffening of the neck, etc., may accompany the delirium. Hallucinations and mania may be present.

Paralysis of different sets of muscles, of different members, or of the entire body may occur. Frequently, varying degrees of aphasia are noted. This symptom may be due to central disturbances, or to local interference of a cervical bubo, or the œdema with the vocal apparatus.

Blood.—A drop of blood from puncture of the ear seems more watery and of a lighter color than normal. If drawn when the circulation is beginning to fail, it may be more or less venous in appearance. No change is noted in the red blood cells. Leucocytosis of the polymorphonuclear type is usually present from the beginning of the disease, varying from eight to forty-five thousand, or even higher, according to some observers. The blood platelets are usually increased in number.

Early in plague the blood is practically free from organisms. Gradually the organisms gain access to and rapidly multiply in it as the disease progresses. The bacilli enter blood either through the lymphatic vessels or by direct growth through the walls of the veins in the neighborhood of the bubo or buboes. During the later stages of plague and at autopsy the bacilli are practically always present. In cases upon which systematic blood examinations have been made, bacilli have been found from twenty-four to forty-eight hours before death. When organisms first appear in the blood, only a few may be seen on each slide. Often only one is found. The number rapidly increases, and frequently the blood is, just before death, practically a pure culture of the plague bacillus. The bacilli occur in the blood singly, in pairs, in chains of from four to five, and in clumps. Then capsules and characteristic staining are easily demonstrated. Appearance of the bacilli in the blood naturally gives an unfavorable prognosis.

From what has been said it is evident that examination of the blood is of very little diagnostic value during early stages of the disease, but later is of the utmost importance. During an epidemic the leucocytosis and increased number of blood platelets are important points in the diagnosis, even in the absence of bacilli, especially in differentiating from malaria and typhoid fever.

Fever.—Plague does not present a characteristic fever curve. The fever may be a simple continuous fever, or may remit, and even intermit. Morning depression and evening elevation are usual. The variation is usually from one to two degrees. Occasionally fever is noted for twenty-four to forty-eight hours after the onset of the disease, followed by normal temperature for twenty-four to forty-eight hours, and then sudden rise in temperature with severe symptoms and death. In one case of this kind observed the patient died within ten hours after the second onset of fever. Frequently the temperature is seen to drop below normal, to be followed within a few hours with a sudden rise and death. Temperature in plague cases usually varies between 102° and 104° Fahrenheit; occasionally 107° has been noted. Height of fever does not seem to bear any relation to the severity of the attack or to the accompanying delirium. Temperature rarely terminates by crisis, but usually gradually subsides to or below normal. A subnormal temperature during the convalescent stage is very common. Fever continues from six to ten days. In the event of the suppuration of the glands the fever shows the ordinary septic type. This type of fever may develop during the later stages of the disease, or some days after the true plague temperature has become normal. On opening the bubo the temperature usually rapidly falls. The degree of fever in plague is easily reduced by the cold bath, but is little affected by the ordinary antipyretic drugs.

Special senses.—During the height of a plague attack deafness may develop, especially in hemorrhagic cases, and in those with cervical primary buboes of the first order. Prognosis is usually favorable.

The conjunctivæ are more or less injected, and true conjunctivitis may superinvene. Keratitis, iritis, and panophthalmitis may occur.

Epidemiology—Portal of entry.—Experience has shown that plague is usually, if not always, an infectious disease, and that the organism must actually be introduced into the system before infection can take place. It is difficult, and usually impossible, to tell in a given case the portal of entry.

There is usually no local reaction about small scratches, etc., which are frequently seen on the extremities when a femoral, inguinal, or axillary bubo is present. Circumstantial evidence goes to show that the organisms gain access to the system through an abrasion of the skin. This abrasion may be either gross or microscopic. From the tissues about the abrasion the bacilli are taken up by the lymph and carried to the lymphatic glands.

The organisms may enter through the external mucous membrane, especially in children. Infection may also occur through the alimentary tract, especially when cold food is used. Inhalation of infected dust in factories or of dried sputum from pneumonic cases is another method of infection, the bacilli entering through the air passages or lungs. It is quite possible to contract the disease through sexual intercourse. In one of my cases this seemed to be the most probable avenue of infection.

Incubation period.—From time to time many experiments have been accidentally performed, which served in a way to determine the period of incubation. From these experiments, and from the large number of people kept in isolation camps it has been found that from two to ten days is the ordinary limit of the period of incubation, usually from three to six or seven days. During the epidemic in India in 1896 and 1897 no case came under observation with an incubation period longer than ten days. Some authors, however, claim that it may be as long as fifteen days.

Direct transmission.—Excretions from the patient, hemorrhages from the nose and lungs, menstrual flow, vomitus, fæces, secretions from pustules and carbuncles, and pus from the bubo contain the bacilli in varying numbers. Any or all may serve as the medium of direct infection. The bacilli have not been demonstrated in the perspiration. In air the plague organism has a very short life; when exposed to direct sunlight it is killed within three hours. An infection may occur while handling any of the above-mentioned excretions, or the bed clothing, etc., used by a patient. The sputum is of especial importance, as the patient may, with this secretion, infect a very large area; this is especially true in plague pneumonia. Naturally the cadaver is infected.

Indirect transmissions.—The plague organism, even when dry, has an indefinite life under certain conditions. Nonexposure to light does much to lengthen this period. Clothing, exposed fabrics, or dust or merchandise infected by means of dead rats or by handling in places where plague existed, or in whatever way infected, may transmit the disease. In this laboratory the plague organism was recovered from dry paper kept in a thermostat for forty-five days. How much longer it would live has not yet been determined. The organism of plague has not yet been found in the esteros or sewers of Manila, but there is no reason to doubt that it might live for considerable time in these locations. Kitasato has found the bacilli in fabrics brought from Bombay. Infected rooms, not properly disinfected, may serve to transmit the disease. Cadavers, even when buried, harbor the organism. Experiments are now being carried on to show how long the bacillus lives when so buried. Thus far, it has been recovered after two months. It has not yet been determined whether the infection is carried in water. Numerous cases are on record where infection has been carried by clothing, etc., which had been packed away for months.

Spreading of the disease is favored by unhygienic conditions, and crowding of dwellings. Individual habits also play an important part. In practically all epidemics, in whatever part of the world, the larger proportion of cases has occurred in sections of the towns having the smallest and poorest ventilated houses, with defective drainage and water supply. In these particular districts people usually crowd together and live under the filthiest conditions. In the better portion of a city infected with plague but few, if any, cases occur.

Spreading of the disease.—Plague infection may be carried from place to place in various ways. Among others, the removal of a person sick with the disease is an important means, as is also the arrival from an infected place of a person who has been exposed to contagion and for whom the incubation period has not elapsed. Under these circumstances the organisms are spread about in the fæces, urine, sputum, and to some extent in the bed clothing of the sick person; the well, of course, not carrying the infection except by clothing, etc., until attacked by plague. The nature of the disease and the precautions to be taken against it are unknown to the general public, therefore its further spread may be easily accounted for. It has been noted that ordinarily first cases imported into a new field attract little attention, as but few cases immediately follow the infection. Bacilli have been found in fabrics brought in bulk from infected ports. This is a most dangerous method of spreading the disease, as these fabrics enter a new field and are handled by the inhabitants, who are thus brought into direct contact with the organisms. The disease may in this way be spread over a large area before its true nature is discovered. The emigration of rats from district to district is also an important factor in the spreading of the plague. Infected rats from ships may also carry the disease from one country to another.

Extension of the epidemic.—When introduced into a new district, plague does not make rapid progress at first. Usually considerable time elapses between each case, and the disease may linger practically without manifestation for one, or, possibly, for two or more years. During this time, however, different areas are becoming infected. These later serve as starting points for a more or less extensive epidemic. Even with beginning epidemic prevalence, the disease spreads slowly, not going from house to house and from district to district, but jumping from one house to a distant one, in the same or neighboring blocks, or in an entirely different part of the city. This is undoubtedly accounted for by the visiting of people in the infected house, or by the using of commodities bought from an infected store. As time goes on, the number of infected places naturally increases, and with this increase an increased number of cases of the disease may be looked for. In an infected city these infected areas may be considered to be the endemic location of the disease for that particular city.

The yearly duration of an epidemic of plague is usually but a few months; rarely does it last longer than six. The majority of the cases occur within two or three months. As a rule, an epidemic of plague has a rather sudden decrease toward the latter part of its course. A few mild cases are noted, however, from time to time for some months after the epidemic has subsided. When once introduced, plague continues from year to year, with an occasional intermission of a year, for an indefinite time. The disease is kept alive during the intervals between the epidemics by mild cases, infected fabrics, houses, etc.

Duration of the disease.—According to most observers, the larger proportion of deaths occurs within the first eight days, usually from the third to the fifth. In severe forms of pest, death may occur within twenty-fours after onset of the first symptoms. When death occurs late during the second week of the disease, secondary infections are usually present. The average duration of symptoms of plague proper is from six to eight days. Secondary infections may prolong the attack from four to six weeks. The convalescent period may be short or long drawn out, due to the severe prostration caused by the attack. Emaciation accompanying a short attack may not be noticeable, but is usually well marked in severe attacks of long standing. General extensive necrosis of all of the organs predisposes the convalescent to secondary infections: suppuration of buboes, parotitis, skin abscesses, suppuration of the middle ear, etc. During the convalescent period, recrudescence of the disease may occur from the first to the eighth week. The prognosis is unfavorable. The same individual may be subjected to two or more attacks of plague, occurring at shorter or longer intervals. Therefore attacks confer only a relative immunity.

Plague among animals.—Plague has been found in practically all the domestic animals. From earliest times writers have noted the susceptibility of rats and mice during plague epidemics. In I Samuel v and vi, plague is mentioned as existing among the Philistines, and the pollution of the fields by mice is noted. To counteract this pollution the Philistines made gold images of mice to appease the gods. Avicena, in 1000 A. D., says that when rats are affected with plague they come out of their holes and act as if drunken. Nicepheros Gregaros, in 1348 A. D., says that rats are affected by plague, and come out of the walls of the houses, etc. He also mentions that dogs and horses are affected. In recent years rats have undoubtedly played an important rôle in the propagation of plague. In numerous instances, before the existence of plague became generally known, large numbers of dead rats have been found in streets, alleyways, etc. Usually during a severe epidemic among the rats they emigrate, evidently to escape the sickness. In this way they carry the disease from district to district. Epidemics are not always noted among rats, even when many people are affected with plague. There is no doubt as to the nature of the disease in the rat, as numerous observers have made careful studies and autopsies and have invariably found evidences of true plague. The source of plague in this animal has not yet been definitely determined and, indeed, is a difficult question to settle. As the plague organism is probably long lived, rats may acquire the disease from some old fabric which was formerly infected with plague, pick up the organism in the ground, or receive the infection from a patient sick of plague. In these instances what might otherwise be a harmless organism may, on new soil, become virulent. From time immemorial, insects, fleas, mosquitoes, etc., have been believed to play an active part in spreading plague, and only recently has the opinion been advanced that fleas are the active agents in spreading the disease from rat to rat, and from rat to man.

Climatology.—The history of epidemics of plague shows that the disease may flourish in the tropic, temperate and frigid zones, at the sea level, and at high elevations, and during all seasons. When once introduced into a locality, plague seems to favor certain seasons of the year, and the yearly epidemics follow these seasons with great regularity. In the Tropics the ending of the cold season and the beginning of the hot, dry season is the favored time. It has been noted that when the temperature reaches its highest point plague begins to decrease. At the end of the dry season and the beginning of the rainy season the epidemic is practically ended. A few cases appear from time to time during the entire rainy season.

Age, sex, race, and occupation.—Age seems to have but little importance as to susceptibility to the disease. Children and old people are alike affected. The great majority of cases, however, range between 20 and 40 years. After 50 years the number of cases is proportionately small. The disease is about equally distributed between the two sexes. All races are alike prone to infection. The few cases occurring among Europeans is due more to social conditions than to racial immunity. Laborers at all trades are affected, but it has been noted that those continually working in water and oil rarely contract the disease.

Plague may be associated with any of the ordinary diseases, and its severest type often accompanies diseases of a chronic nature.

Mortality.—Mortality in the several epidemics of plague varies greatly, ranging from 30 per cent to 93 per cent. In Manila, in 1900, the mortality was 73 per cent, including all cases.

Methods to be used when the presence of the plague is suspected.—An early diagnosis of first cases is essential. This may be made by a thorough microscopical and bacteriological examination, or, in the event of death, by autopsy. The agglutination test is of diagnostic value; it is usually positive after the ninth or tenth day.

Suspected cases should be isolated and closely observed. Those associated with the suspected cases should also be isolated in a detention camp for at least ten days. The effects and dwelling of the suspected case should be thoroughly disinfected. Unhygienic localities should be cleaned and disinfected. It would be cheaper to destroy these sections than to endure from year to year expensive methods of handling the disease and the check to commerce usually experienced.

The plague hospital or detention camp should be in an isolated spot and so constructed that all of the infectious material may be easily sterilized.

Methods pursued in combating an epidemic.—The ordinary methods pursued are: Searching for and removal of sick; isolation of those known to have been exposed to the disease; cleaning and disinfection of houses in which sick have been found, including its surroundings, furniture, clothing, etc., used by the occupants.

Early removal of sick reduces to a minimum the amount of infectious material which they may scatter in their immediate vicinity. Information regarding sick is obtained either by house-to-house inspection or by dividing the city into districts in which the inhabitants are required to report all cases of sickness to the nearest health officer, whose duty it is to diagnose and dispose of each case. Positive and suspected cases of plague should be transferred to the hospital. Those exposed to contagion should be isolated, preferably near the plague hospital. Ten days is the usual period of isolation.

The house and surroundings should be thoroughly cleaned and disinfected. For this purpose, carbolic acid, bichloride of mercury, tricesol, or any other cheap, reliable disinfectant may be used. The furniture should be washed with disinfectants, and the clothing, etc , especially that used by the sick, should be disinfected by steam or soaked in a 3 to 5 per cent solution of carbolic, or a 1 to 1,000 bichloride solution, for one hour.

The general hygiene of the infected locality should be improved. A systematic cleaning of houses, yards, streets, and sewers should be carried out. An attempt to exterminate the rats should be made. This may be done by poison, depriving them of their hiding places, etc.

The inhabitants of infected localities should be taught the nature of plague, and the individual precautions to be taken against it. This may be done through the newspapers, posters in each dialect and language, schools, churches, etc.

Individual prophylaxis.—Those coming in direct contact with the disease should disinfect the hands with carbolic acid or bichloride of mercury immediately after exposure. When cuts, scratches, etc., are on exposed parts, infectious material should not be handled. General cleanliness should be maintained. The clothing should be covered; the feet protected; recently cooked food, only, used, and infected localities, houses, stores, etc., as far as possible, avoided.

Quarantine regulations can not be too rigorously enforced.

No passengers nor animals should be allowed to leave the infected port except in the case of passengers after a period of detention of ten days; all baggage and cargo should be thoroughly disinfected. If during an ocean voyage of more than ten days' duration plague does not develop aboard ship, the passengers may be allowed to land; otherwise, a quarantine should be established, and the effects of the passengers, cargo, and ship should be disinfected.

General clinical observations.—Writers on plague have given many distinct forms to the disease, but the following completely cover the ground: Pestis minor, pestis bubonica, septicæmic plague, pneumonic plague. Of these, the bubonic type is most common, the septicæmic form second in frequency, and pestis minor predominant before and after an epidemic.

Pestis minor is often noted many months before and after the real epidemic of plague. It may appear in sporadic cases or in a light epidemical form. Usually, when isolated, one or more buboes develop, with more or less fever. The symptoms are, as a rule, light. The organisms may be found in the bubo and the blood, but, as a rule, are not highly pathogenic. The bubo may go on to suppuration or resolution. Afterwards, severe epidemic cases are seen, in which a single gland or group of glands is enlarged, painful, associated with more or less debility, dizziness, headache, sleeplessness, some disturbance of digestion, and more or less fever. The nature of these cases is, in part, determined by the place of dwelling. They most frequently develop in houses in which plague was common during an epidemic.

The bubonic type.—Ordinarily, onset of the disease is sudden, without any prodromal symptoms whatever. Occasionally a train of prodromal symptoms may be noted for twenty-four to thirty-six hours before the onset of fever. These symptoms are usually a general bad feeling, weakness, light chills, pains in the legs, some headache, sleeplessness, and loss of appetite. There may be some vomiting and dull pain about the seat of the future bubo. Usually, as stated, the disease begins suddenly with a fever. The fever may rise suddenly, reaching its highest point during the first day of the disease, or it may gradually rise, taking from two to three days to reach the fastigium. The onset of the fever may be accompanied with an initial chill of varying intensity. In addition to the initial chills, chills of more or less severity may continue at irregular intervals throughout the course of the disease. These chills do not seem to bear any direct relationship to the course of the fever or to the severity of the attack. The bubo usually develops from the second to the fourth day of the disease. Patients are usually admitted to the hospital during the bubonic stage. The following general conditions have been noted: Perspiration apparently greatly diminished, or entirely absent; occasionally more or less profuse periodical perspirations; skin usually œdematous, especially on the extremities; frequently intense itching; some pain in skin from time to time; over the bubo more or less reddening; skin usually dry and hot.

In the early epidemics of plague, subcutaneous hemorrhages were evidently more frequent than in recent ones. Ordinarily, hemorrhages do not appear until late in the course of the disease, or just before death.

The facial expression is often most peculiar, and, when once seen, can never be forgotten. It seems to be a mixture of pain, fear, and anxiety. The eyes may or may not be deeply sunken, and dull in appearance. The pupils are usually slightly dilated; in some cases the eyes have a fixed, staring appearance. Convergent strabismus is frequent.

The tongue is usually heavily coated white, and later during the disease is of a brownish color along the center. The papillæ usually stand out prominently and the edges are bright red and œdematous. The entire tongue seems to be swollen. The pharynx is usually reddened and may be deeply congested. The tonsils do not show any constant symptoms. The veins of the neck are usually distended and pulsating.

The movements of the two sides of the thorax are equal. Palpation usually shows the vocal fremitus increased. The percussion note may be somewhat defective, and ausculation usually reveals a slightly roughened breathing sound, with more or less moist rales. Respiration is usually somewhat shallow, apparently labored, and increased in frequency, often reaching a rate as high as fifty or sixty per minute. This is undoubtedly due to the extreme congestion, œdema, and bronchitis or bronchopneumonia noted in the lungs. The heart is usually somewhat dilated, the area of pulsation increased and a soft systolic murmur audible. The pulse is weak, often dicrotic, small, and easily compressed. The rate is usually increased, ranging from 90 to 140, or even as high as 180, beats per minute.

The abdomen usually presents nothing of interest. Seldom is the spleen palpable and the liver is usually normal in size. When the mesenteric glands are markedly involved, considerable pain may be felt over the entire abdomen. Occasionally the involved iliac glands may cause considerable pain.

The urine presents the usual febrile characteristics, diminished quantity, with some blood and pus cells. Occasionally there may be a complete anuria. There may be either diarrhea or constipation.

As has been noted, the primary bubo of the first order may be preceded by indefinite pain in advance of the usual initial symptoms of the disease. Beginning with the initial symptoms, the glands may begin to enlarge and be very painful. Ordinarily, however, the glands do not begin to enlarge until from the second to the fourth day of the disease. The rapidity of the processes at work in the glands varies greatly. Within a few hours the gland may reach its largest size; ordinarily, however, the process requires from two to four days. During the stage of development of the bubo the pain is usually severe. In comatose cases, pressure on the bubo may elicit evidences of tenderness when other attempts fail to arouse the patient. When the bubo is fully developed, the pain usually diminishes in intensity or entirely disappears. In the event of suppuration more or less pain may be present. In favorable cases suppuration usually occurs during the second week of the disease. The second-order bubo rapidly follows the primary bubo of the first order. The characteristics of the second-order bubo have already been described.

Affections of the nervous system above described may be present. The prostration is, perhaps, the most constant symptom accompanying plague, and is usually found in a degree not to be seen in other infectious diseases.

The facial expression, increased pulse, rapid respiration, extreme prostration, and the presence of buboes present a striking, characteristic picture which can not be confounded with that seen in any other disease. Naturally, the prominence of each symptom varies greatly.

Septicæmic plague.—This is the most virulent form of plague and usually begins without any premonitory symptoms, with high fever and general collapse. Symptoms noted in the early stages of the disease are practically the same above described, except of a severer type. The pulse is usually very rapid, extremely feeble, and may be intermittent. Delirium may be present, and coma may develop early in the disease. The spleen can frequently be felt, and all the glands of the body are somewhat enlarged, without any primary buboes of the first order. There may be severe pains in the stomach, with frequent vomiting of blood. Blood may also be found in the stools and the urine. Prostration is usually severe. Bacilli are found in the blood from the beginning. Death may occur in this form of the disease within twenty-four hours after the onset of the first symptoms.

Plague pneumonia.—From descriptions found in some of the older writings, it is evident that plague pneumonia has existed in all epidemics, possibly to a greater extent formerly than now. Childe first determined the true nature of the train of symptoms which had been previously observed.

The pneumonia naturally divides itself into primary and secondary forms. The primary pneumonia is the form of plague usually styled "plague without buboes." The secondary pneumonia may be caused by infection through the circulation or by inhalation of infected matter from the upper air passages. The onset of the disease is usually sudden and without any prodromal symptoms. It is commonly ushered in by a chill of greater or less severity. Frequently this chill is followed in a few hours by a second chill of varying intensity. Occasionally no chill is experienced. The general condition of a patient usually seen in the ordinary type of plague immediately follows the chill, and for a time it is impossible to determine whether the disease will assume a bubonic or pneumonic type.

The number of cases of primary pneumonia, which have been closely studied from the onset of the disease, has been limited, but from these it has been found that the pneumonic symptoms usually develop from the second to the fourth day. Commonly, more or less cough is present, associated, as a rule, with an increased amount of expectoration. Varying degrees of dyspnœa and cyanosis may accompany the cough. The rusty sputum of lobar pneumonia is not present. Associated with the cough is more or less hemoptysis, which gives a bright red expectoration. The sputum is often streaked with blood; on the other hand, it may be entirely free from blood. The plague bacilli are present in enormous numbers, frequently in pure culture. The absence of herpes in plague pneumonia is of a diagnostic importance. The pulse is usually very weak, and reaches, in these cases, 180 beats per minute, while the number of respirations may be as high as 75. More or less bronchitis is present, from the onset of the disease. The diagnosis of plague pneumonia may be difficult. This is due to the smallness of the areas of infected lung tissues. Within a very short space of time, however, these areas enlarge, when typical symptoms of pneumonia may be found. The spleen is always enormously enlarged in the pneumonic plague, and may be easily palpated. This is of a special importance in diagnosis. As the disease advances, septicæmia, carbuncles, and enlarged glands in various portions of the body may be found. The patient may infect the skin by means of scratching, giving rise to a primary bubo of the first order, with its usual train of symptoms. In plague pneumonia the glands at the base of the lungs would naturally be classed as primary buboes of the second order. Other enlarged glands would be secondary buboes, except in the event of a second infection, giving rise to a primary bubo of the first order. The infected lung may go on to necrosis and gangrene. The disease is usually fatal from the second to the fifth day; a few cases, however, have been known to recover.

To recapitulate: The chief points in the diagnosis of plague pneumonia are: Extreme prostration; high pulse; rapid respiration; characteristic sputum with plague bacilli; absence of herpes; enlarged spleen; physical changes in the thorax.

Secondary pneumonia in plague may be of the ordinary type, similar to that occurring in any infectious disease. In this class of pneumonia the sputum is not characteristic and never assumes the character of that seen in primary plague pneumonia.

The plague bacilli are always present. More or less blood is coughed up, which may or may not be intimately mixed with sputum. The pneumonia varies in degree from a light broncho to a lobar pneumonia. The usual physical signs are present, and need not be described. There may also be varying degrees of pleurisy. Secondary pneumonias usually occur at the height of the disease; that arising from emboli may occur at an earlier date. This complication is usually fatal.

Prognosis.—Prognosis naturally depends on the resistance of the individual, the location of the bubo, etc., the severity of the complications and especially on the virulence of the organism. During the course of the disease, but little can be said regarding the outcome, as any or all of the symptoms may change for the worse, without warning.

Generally speaking, the prognosis is unfavorable. The mortality, as has been noted, varies from 30 to 93 per cent.

Diagnosis.—During an epidemic the diagnosis usually offers no difficulty. The sudden onset, the rapid development of fever, and general extreme prostration are sufficient to establish the diagnosis. There is no disease in which prostration reaches such an extreme degree as in plague. When the above symptoms are associated with buboes, the nature of the disease is evident. In localities free from plague, and before and after an epidemic, the differential diagnosis may be difficult, or even impossible.

Light cases with buboes and slight general symptoms, with some fever, may be mistaken for what is called "climatic buboes." Climatic buboes usually occur in the groin, are painful and may go on to suppuration. Some fever is present. The attack is usually over within a week. The disease may be sporadic, or appear as a slight epidemic. The bubo and blood are bacteriologically negative. In plague cases, the glands are usually, and the blood may be, positive bacteriologically. The two diseases may be of equal severity.

In children, febrile adenitis must be considered. Febrile adenitis may be sporadic or epidemic. The disease occurs with some fever, which may reach 103° or 104°, and usually more or less cervical glandular swelling. Occasionally an axillary gland may be involved. The attack is usually light and lasts but a few days. The glands are negative bacteriologically. If the attack assumes a serious nature the disease may be at once differentiated from plague.

Light cases of plague may be confounded with venereal buboes. A thorough physical examination should make differentiation easy.

Severer attacks of plague, especially in the absence of buboes, must be differentiated from malaria, typhoid, and relapsing fevers. In these cases the general symptoms of the disease must be carefully considered. The sudden onset, conjunctivitis, reddened pharynx, rapid inspiration, etc., must be sought for. Blood examinations will usually give the surest diagnosis. In relapsing fever the blood examination is distinctive.

Dengue fever occurs with fever and glandular swellings. The pain about the joints and in the muscles associated with the exanthema and the favorable termination of the attack suffice to separate the two diseases.

Rubeola and mumps, with glandular swelling and the absence of the other symptoms, may be confounded with plague. Here the microscope is of service.

Diphtheria with minor throat symptoms may simulate plague. Here the bacteriological examinations are most valuable.

In the absence of external glandular enlargements, with extensive involvement of the mesenteric glands, especially those about the cœcum or of the higher iliac glands, appendicitis must be considered. The general appearance of the patient, the vomiting, fever, leucocytosis, and localized pain about the lower right side may be misleading. Examination of the blood may or may not determine the nature of the disease. Increase of blood platelets may, in the absence of the organism, aid in the diagnosis; within a few hours the development of the bubo may solve the problem.

An isolated case of plague pneumonia may pass unnoticed, especially when of the bronchitic or broncho-pneumonic type. The sudden onset, with extreme prostration, the character of the sputum, and the finding of the bacilli serve to make the diagnosis. If these symptoms are not noticed the development of a bubo will facilitate the diagnostication.

Lesions of the skin in pest rarely offer any difficulty, as other positive symptoms are usually present. Malignant pustules must be considered.

In locations liable to plague, too much care can not be exercised. Considering the manifold manifestations of plague, and the importance of diagnosing the first case, one's suspicions should always be active. In the event of death an autopsy should by all means be performed, when the nature of the disease can usually be determined.

Treatment.—The treatment of plague naturally divides itself into sustaining and improving the general condition of the patient, and into reducing, as far as possible, the unfavorable action of the toxins and bacteria in the system.

Under the first division is included the symptomatic treatment, which naturally varies from time to time, and comprises the usual routine, such as cold baths, heart stimulants, and palliative treatment of the pain, etc.

The treatment of the bubo has been, and is, a much-disputed question. Many advocate the early removal of the affected gland, while others oppose this method. From the study of the pathology of plague, it appears that removal is, in most instances, of no practical benefit. Usually the deep glands of the infected chain are involved before the operation could be done, and would naturally serve as an uninterrupted source of infection. It would be practically impossible to remove the entire chain of glands. Ordinarily it is best to allow the glands to remain, and to open them when suppuration begins.

The skin lesions should be treated in the ordinary antiseptic way. All wounds should be carefully watched, as they may serve as sources of infection.

Results of experiments seem to show that smaller animals can be made immune to the disease, and that the serum prepared from immune animals has protective and curative properties when inoculated into other animals. Attempts to prepare antipest serum have, until very recently, been more or less unsuccessful. The serum was not of sufficient strength to be of any practical therapeutic use. Yersin's serum, obtained from the Marine Hospital corps, has been found useless here. Recently a small quantity of serum was obtained from Tokyo. With this, two out of three patients have recovered. In one case the bubo was not opened; in the second, they were, while the third case was too far advanced to offer any hopes of recovery. At present, the serum is too weak to admit of general use, as the necessary quantity could not be produced. Inoculation with small quantities gives a temporary immunity.

Protective inoculation, as practiced, is said to be of value. Sterile cultures are most commonly used. Local reaction and some fever usually occur, and may last three to six days. The protective power does not develop for six to eight days, and when developed is only temporary. Protective inoculations are not practical for the following reasons: Enormous plant necessary to produce the material; working force needed to inoculate the inhabitants; opposition of the people to the inoculation; temporary benefit derived. While statistics are favorable to protective inoculation, study of the epidemiological features of the disease throws considerable doubt on its real value.

Observations upon Diseases in the Tropics, by Maj. Charles F. Mason, Surgeon, Twenty-sixth United States Infantry, Volunteers, Jaro, Province of Iloilo, P. I., November 15, 1900.

These remarks are based upon careful observation during about a year of service each in Porto Rico and Panay, P. I.

In the first place, as to acclimatization; if that term is intended to convey the idea that the constitutions of white men gradually adjust themselves to tropical conditions and thereby become better able to withstand disease, then I do not believe that there is any such thing as acclimatization. Men do gradually learn how to take better care of themselves, and to that extent are less liable to disease, but in my opinion the great majority of white men in the Tropics suffer a gradual deterioration of health, and year by year become less and less fit for active service.

In the second place, I am struck with the relative infrequency here of certain diseases common in Porto Rico, while certain other diseases often met with here were of rare occurrence there. This difference is shown in the following table:

Disease.	In Porto Rico.	In Panay.
Filariasis	Common among natives	Rare or absent.
Ankylostomiasis	do	Do.
Chiggers	Common among soldiers	Do.
Syphilis	Common among natives and soldiers	Do.
Malarial fevers	Common among soldiers	Uncommon.
"X" fever	do	Rare or absent.
Pyæmia	Uncommon	Not rare among soldiers.
Beri-beri	Rare or absent	Common among natives.
"Y" fever	do	Common among soldiers.

While I have not seen a case of syphilis originating here, other venereal diseases are abundant; in Porto Rico syphilis was a scourge.

This island had the reputation of being malarious, but I did not see a clearly defined case until the return of two of our companies from field service in Negros, when a large percentage of those organizations were affected with typical malarial intermittent and remittent. Unfortunately, I had no microscope, but the disease yielded promptly to quinine. Since a microscope has been available the only malarial organisms I have found have been in patients who have suffered severely with malarial fever in Cuba.

The fever which I call "X," as denoting my ignorance of its nature, I have not seen here, while it was very common in Porto Rico. It was evidently of a specific nature; began suddenly with chilly sensations, high fever, nausea, frequent vomiting, constipation, headache. After five days to a week the temperature fell to normal, with slow pulse, jaundice, and albuminuria. The patients appeared very sick, but always recovered.

"Y" fever, also an unknown quantity, occurred here epidemically at the end of the dry season. Like "X" it was evidently specific, beginning abruptly with chilly sensations, headache, rheumatic pains, and high fever. There was usually a sudden fall to normal in five to seven days, the drop in temperature being attended with profuse sweating and marked weakness. There was no eruption, no secondary fever, no jaundice. The patients all recovered, but slowly, and convalescence was often accompanied by obstinate neuralgias. This is the disease that was often diagnosed "dengue," but it frequently occurred in patients only recently recovered from the latter disease, and must not be confounded with it. True dengue also prevails here.

The pyæmia referred to is a very interesting condition, but though I have seen a number of cases they were all in hospitals not under my charge, and I can only briefly refer to it. Its distinguishing feature is its origin without apparent cause. The patient begins to lose health and strength and to have chills, fever, and sweating; then some limb or joint is observed to be swollen, and upon examination pus is found. The abscesses are nearly always large, deep seated, and uncircumscribed; favorite sites are the groins, axillas, and buttocks. One after another they are opened and drained, until the patient usually dies from exhaustion and septicæmia. Most of the cases have given a history of antecedent gonorrhea, and in the absence of more obvious causes this possible source seems worth considering.

Dysentery and diarrhea are about equally common in both islands, but there is a type of diarrhea here which I did not see in Porto Rico. This form of disease closely resembles in symptoms the hill diarrhea of Manson, but prevails at all levels. It occurs epidemically at the commencement of the rainy season, and is characterized by profuse, pale, watery, frothy stools with much flatulence and colic, the movements commencing after midnight, almost or entirely ceasing by noon. It appears to be dependent upon suspension of the functions of the liver and consequent flatulent indigestion, the result of overeating and chilling of the abdominal contents by cold drinks, exposure to cold in the early hours of the morning, and excessive dampness.

Dysentery prevails throughout the year, but there is a marked increase in the number and severity of the cases at the commencement of the rainy season and a progressive increase in both respects until a maximum is reached toward the end of August. It is by far the most serious disease which attacks the white soldiers in the Tropics both as regards its mortality and its invaliding effects. Out of 32 deaths from disease in the Twenty-sixth United States Volunteer Infantry during its first year of service in the Philippine Islands, 16 were from dysentery and its complications, and 10 more from typhoid fever.

Boils, abcesses, and leg ulcers are very common, the latter especially during campaign, when it is impossible to keep the underclothing clean. Though not dangerous to life, these seemingly trifling ailments put a large number of men out of service temporarily and correspondingly swell the sick report.

Suppurative inflammation of the middle ear with perforation of the drumhead is of frequent occurrence. It is insidious in its commencement, often deafness and sudden discharge of pus being the first symptoms noticed. Upon examination an acute catarrhal pharyngitis is usually found.

Another interesting condition is the prevalence of buboes, both in the groin and axilla, without discoverable point of origin. Frequently a careful examination of the tributary lymph district fails to reveal any lesion whatever; and this though the bubo may proceed to suppuration.

Smallpox, which is widely prevalent during the dry season, disappears almost completely during the rains. Possibly this may be explained by the greater freedom of communication in the dry season, or more probably by the active agency of dust as a carrier of infection.

BERI-BERI.

The only case of beri-beri in the person of a United States soldier was reported from Carranglan, Nueva Ecija, Luzon, by Contract Surgeon J. M. Ward. The patient, a colored soldier of Company G, Twenty-fourth United States Infantry, was admitted into hospital June 16, 1900. For six months prior to admission he had been subject to occasional malarial attacks of no great severity or duration. On the day of his admission he had a severe chill, followed by the usual fever, but accompanied with unusual and excessive pain in the head, back, and lower limbs. Next morning the headache continued and he had much pain and stiffness, particularly in the right leg, in which the reflexes were abolished. The space limit for the sensation of two points varied from 4 to 6 inches at various points. Tickling the soles of the feet gave some response on the left side; none on the right. The loss of power in the right quadriceps extensor was so marked as to make locomotion practically impossible. The circumference of the right thigh measured 20 inches; bowels normal and urine free from sugar and albumen. Temperature 37.4° C. The history of this case is given in the following extracts from Dr. Ward's report:

June 20.—General condition unchanged. Loss of power in the extensor muscles so great that patient can hardly stand; locomotion entirely lost. He complains of great pain on slightest movement of lower extremities and numbness and tingling principally in right leg. Atrophy visible to the eye; thigh circumference 18 inches.

June 25.—Unchanged, except increasing loss of muscular power and decrease in pain and stiffness; thigh measurement 16¾ inches.

June 30.—Seems much improved; appetite returning; sleeps well; bowels regular. Measured to-day 16 inches around thigh.

July 15.—For last two weeks great improvement. No pain on movement; can stand without crutch. Thigh measurement 15¾ inches.

July 25.—Patient has steadily improved except for slight iodism one day. Walks to company kitchen for meals.

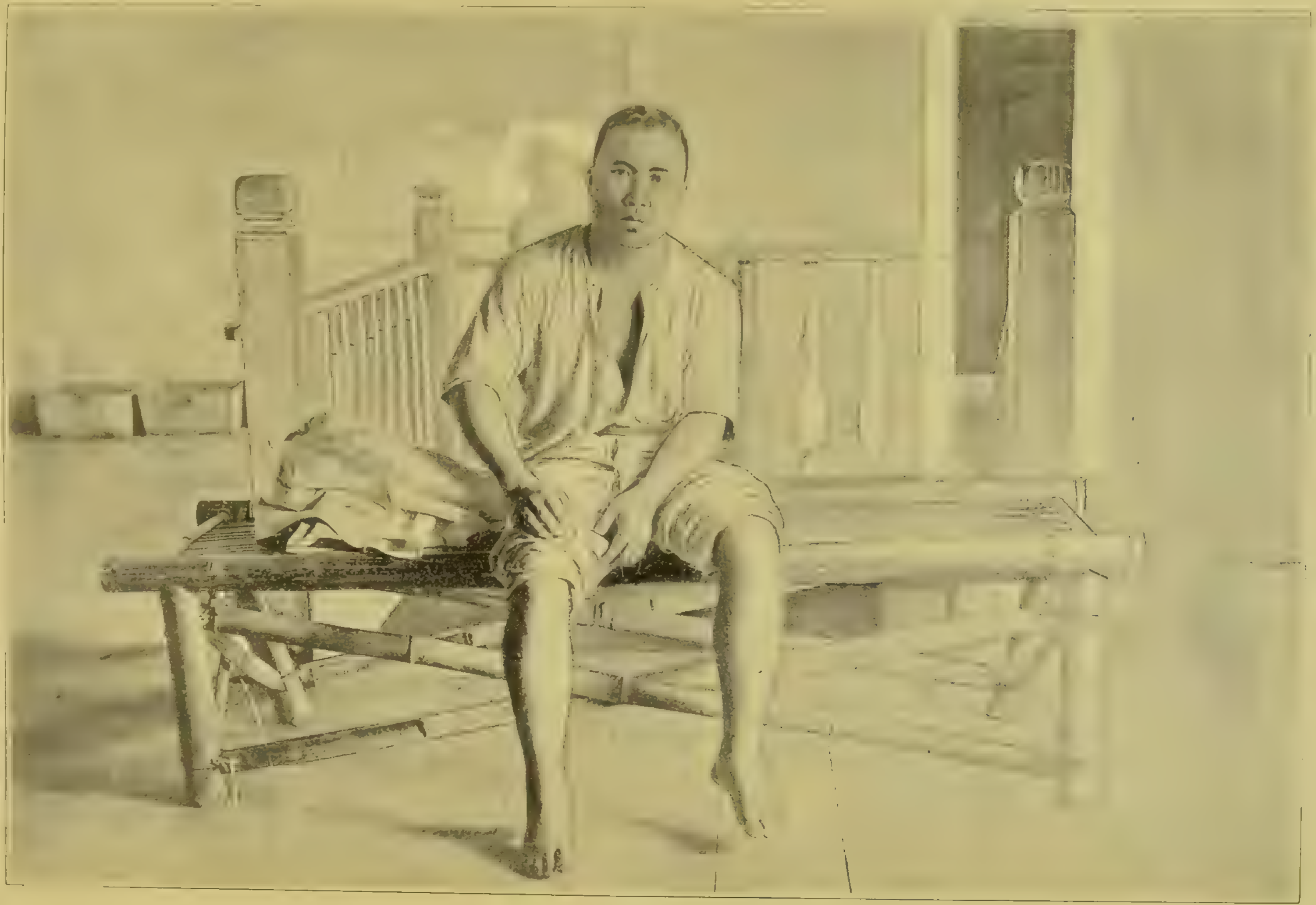
July 27.—Discharged to quarters. No sign of the morbid process remains except general weakness and some cardiac irritability.

On admission the usual antimalarial treatment was given, with a hypodermic injection of morphia. Afterwards the treatment was tonic with special diet; iodide of potassium, 10 grains, increased to 30 grains, three times a day, and strychnia sulphate by hypodermic injection in the quadriceps extensor twice daily; massage one hour every day,

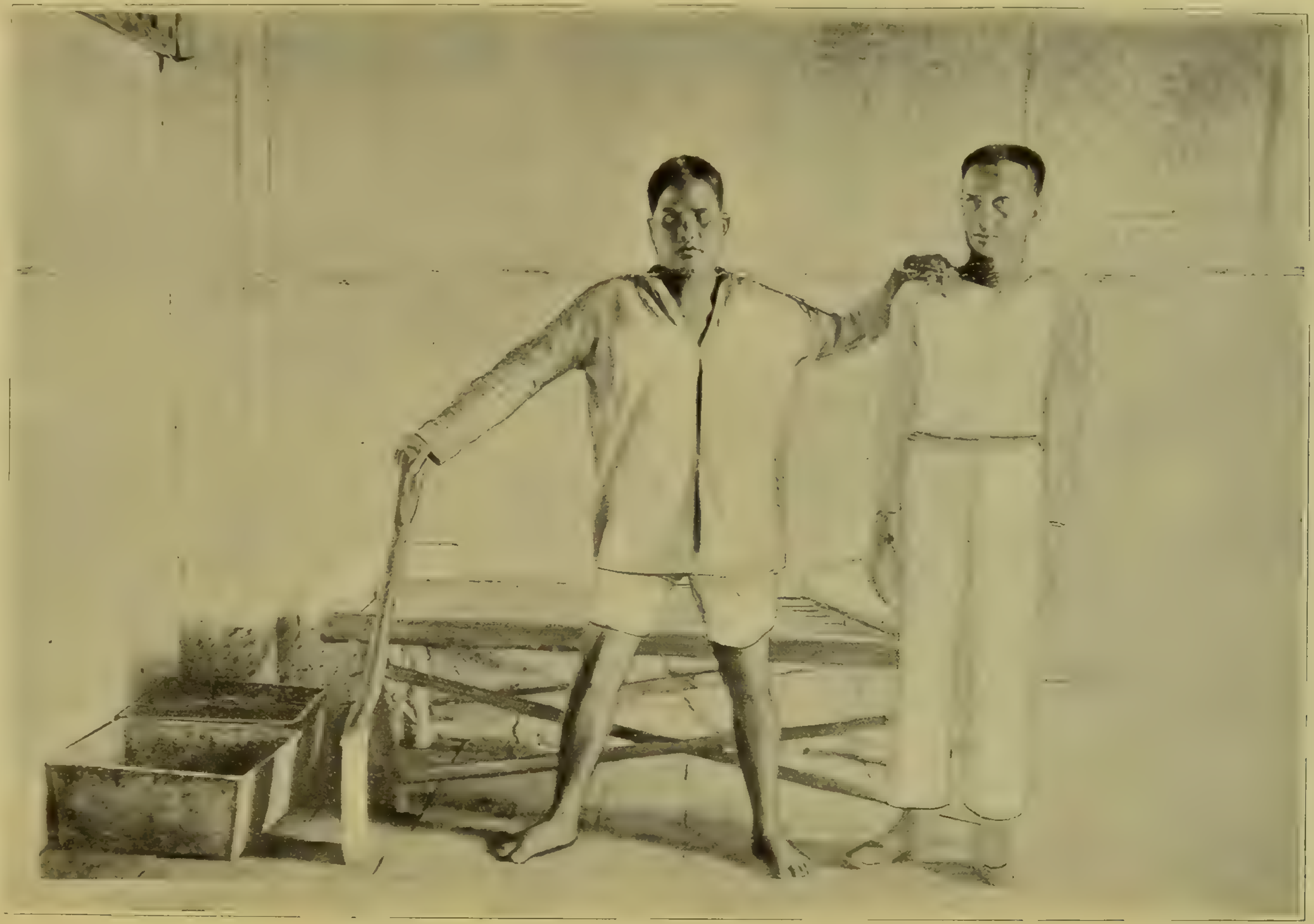
Beri-beri has prevailed quite extensively among the Filipino prisoners of war. Special rations were provided for these cases and a marked improvement in their condition was recorded as a result. About 50 per cent of all sickness among prisoners is said to be due to this disease.

REPORT OF AN EPIDEMIC OF BERI-BERI AMONG NATIVE PRISONERS IN THE UNITED STATES MILITARY PRISON, LINGAYEN, PANGASINAN, P. I., BY CONTRACT SURGEON FRANK L. R. TETAMORE, JANUARY 31, 1901.

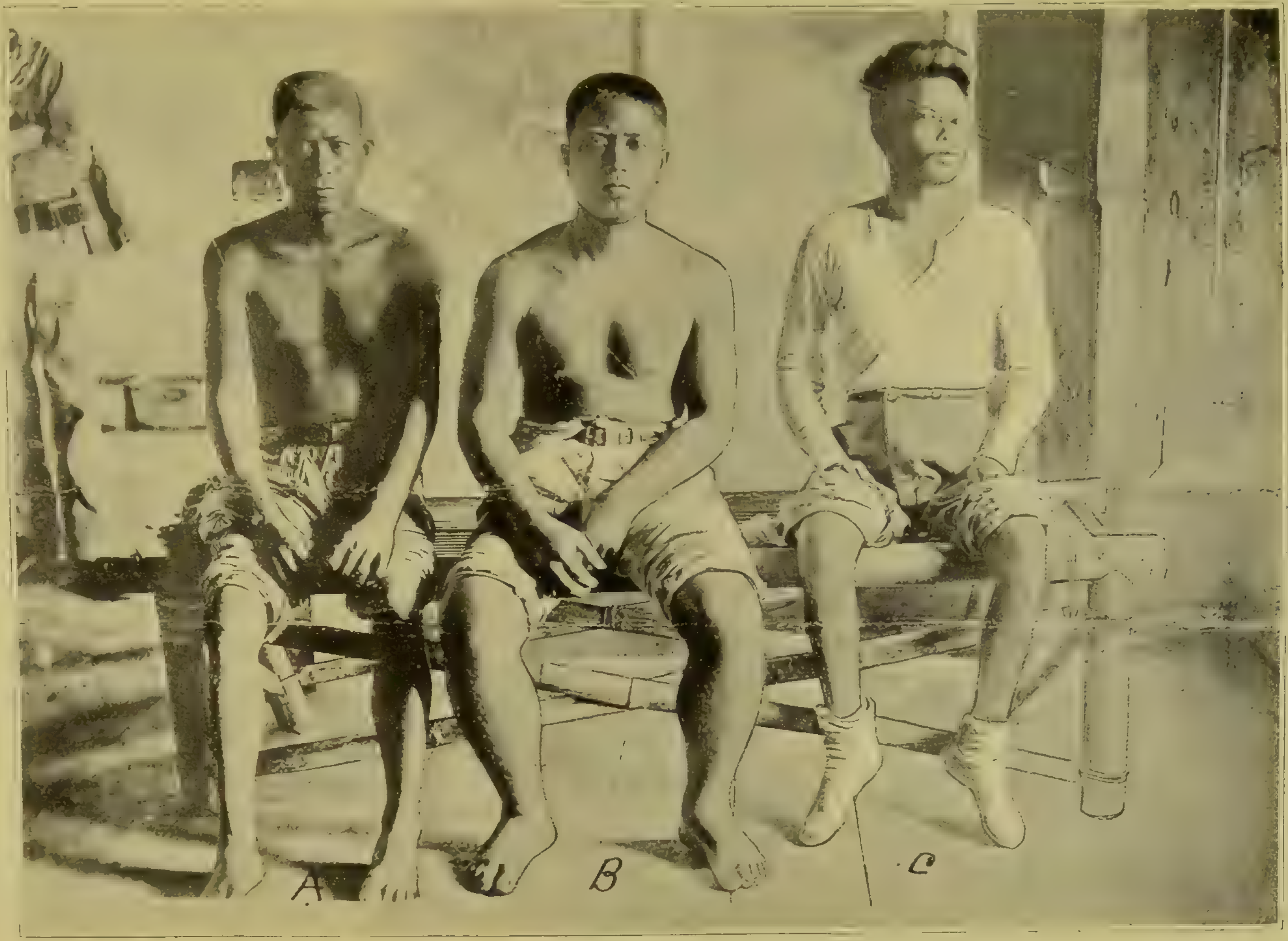
The hospital for native prisoners at the Carcel de Lingayen, P. I., is a large building with stone foundations and stone walls to the first floor. The ground floor is occupied as a general ward for the sick, except beri-beri patients. The floor above is used exclusively for beri-beri patients. There are two rooms; the large one, used as the general ward, is a light and airy room, with windows on all sides. Ventilation and sanitation are good. The small room is used for isolated cases. All the floors are wood. The sick sleep on bamboo bunks, with blankets and pillows; each one has a woolen blanket or bamboo mat. All food is cooked in the building and sufficient dishes are provided. One native acts as wardmaster, with four to assist as nurses. A native physician, with the assistance of a practicante, is employed to treat the sick under the supervision of the station surgeon. The service is now very sat-



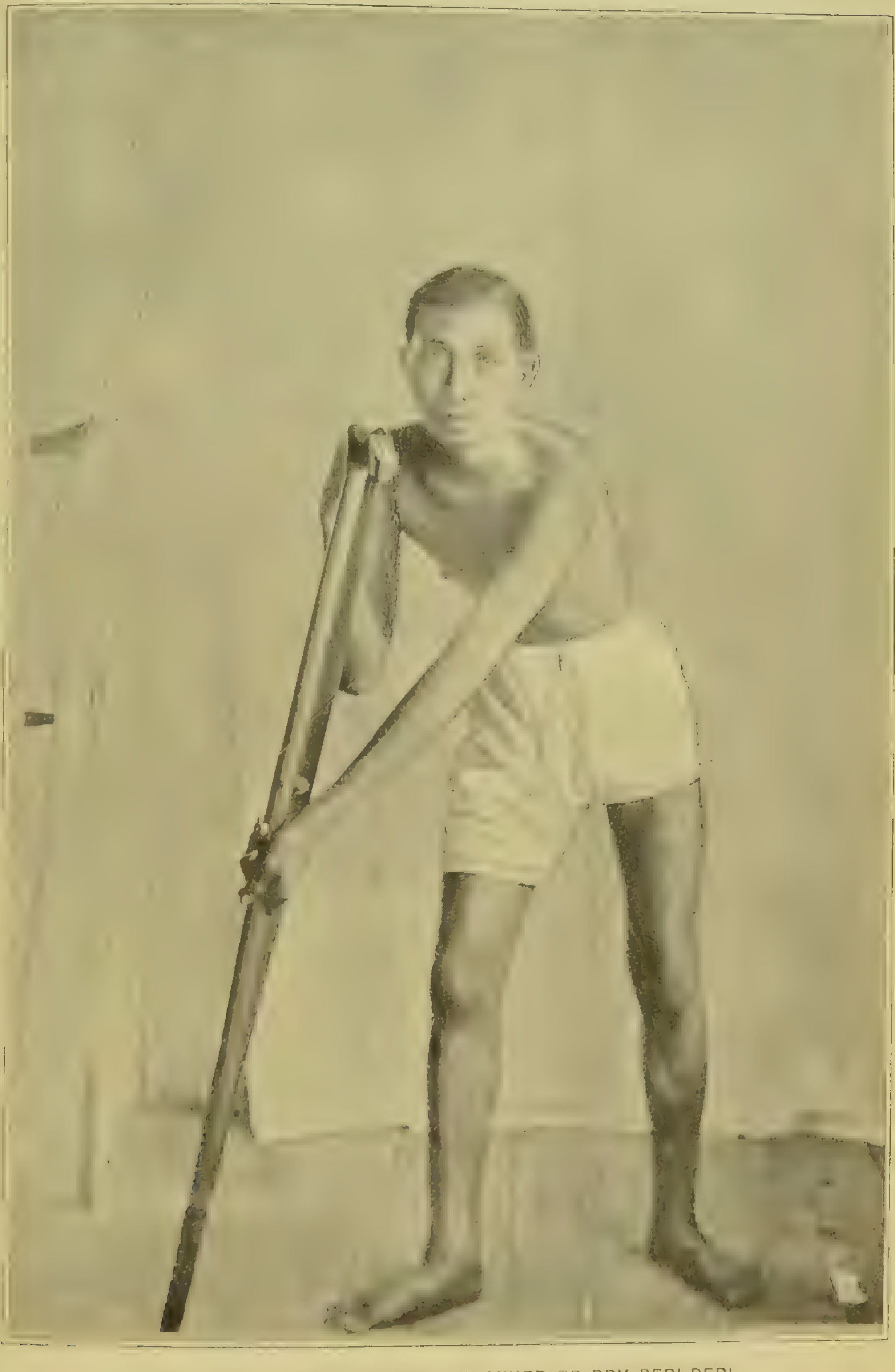
No. 1.—WET BERI-BERI.



No. 2.—MIXED BERI-BERI.



No. 3.—A, MIXED BERI-BERI; B, WET BERI-BERI; C, DRY BERI-BERI.



No. 4.—THE POSITION TAKEN IN MIXED OR DRY BERI-BERI.

isfactory. An inspection of all buildings and grounds is made daily, and oftener if necessary. Complete records are kept.

The dispensary is well equipped with the necessary outfit and drugs, which are furnished on requisition from the civil funds.

The food is a great deal better than it was. If it were practicable to give the patients their native food it would be better, but I do not see how it can be done or how any improvement can now be made. The diet at first was mostly rice and salmon; it is now fresh beef, potatoes, tomatoes, beans, rice, salmon twice weekly, beef tea, hard bread, cream, coffee, and such vegetables as can be procured in the markets. The food is prepared by native cooks. It is a question if the food they were getting was the cause of the outbreak of beri-beri. My opinion is that the disease was caused by the bad sanitary conditions of the prison and grounds, together with the poor food, for since improvements have been made and the food changed there has been a gradual improvement in the health of the convicts, and while there has not been any case of beri-beri among the American prisoners, their general health has been better. In November there were at least five Americans in hospital daily, in January less than one on an average.

Beri-beri affects only the natives, and is the prevailing sickness. The epidemic started in the prison October, 1900. The following table shows the number of patients treated in the hospital since then:

	New cases.	Died.	Returned to duty.	Remaining sick.	Convalescent.
October, 1900	22	4		18	
November, 1900	32	12		38	
December, 1900	58	8	20	68	31
January, 1901	29	7		90	45
Total	141	31	20	90	45
Time sick before death:					
Less than 1 month		5			
1 month		19			
2 months		7			
Time in prison before taken sick:					
Less than 1 month	3				
1 month	11				
2 months	13				
3 months	17				
4 months	16				
5 months	22				
6 months or longer	41				

This statement shows but 20 returned to duty. Many of those remaining as convalescent are comparatively well, but are kept in hospital until the improvements being made in the prison are finished. It requires at least three months for patients to recover fully. This disease has been classified by some writers as wet, mixed, and dry. This is a good classification and easily understood, as the terms clearly indicate the different conditions. The line can not be distinctly drawn between the wet and mixed. As I have seen it here in all its stages and tried to observe very carefully, I can not concur with the statement made by many that it is a multiple neuritis. I have made seven autopsies, finding the same effusion in the pericardial and pleural cavities, the pericardial sac in each case completely filled with fluid. (Specimens of these autopsies have been sent to the laboratory of the Army at Manila for examination.)

The fluid found in the cavities is the same in the wet as in the dry. The following photographs taken by myself show the different forms: No. 1. Wet beri-beri, under treatment in the hospital one month. The legs are œdematous and the face and neck much swollen, looking like mumps. In this case there is not, nor has been, any paraplegia; the first symptom was a numbness in both legs, no chill nor pain. There was no pitting on pressure, except along the sides of the crest of the tibia. The patient died suddenly five weeks after entering the hospital. The pericardial, pleural, and peritoneal cavities were filled with fluid of an amber color. No. 2. Mixed beri-beri. There is some œdema, not extensive, in both legs and not above the knees; the face and neck are swollen; there is almost complete paraplegia, the patient having been unable to walk for more than a month. Recovery in three months. This photograph was taken after he was in the hospital one month. No. 3. A. Shows mixed beri-beri with symptoms as in No. 2, except that the paraplegia was partial; his gait was as shown in the photograph. B. Wet beri-beri. This was the most severe case, with extensive œdema; the legs and thighs were swollen, also neck and face; there was no paraplegia; his first symptoms were numbness in both legs, aching pain in the calves, and complete anaesthesia along both sides of the crest of the tibia so that a deep needle puncture was not felt. After the first few days the aching pain subsided, giving place to a pain in the same parts only when getting up or suddenly changing a position, but not while walking. Appetite good; bowels regular or somewhat constipated; no fever, the temperature usually subnormal. Pain over the heart and dyspnea very severe during the week before death. C. Dry beri-beri. No œdema, but complete paraplegia; general conditions atrophic. The paralysis was gradual, the patient becoming completely helpless during the third week. There was no numbness above the hips nor swelling of the face or neck; no chill nor fever. The disease was at its height during the eighth week, after which gradual recovery took place. No. 4 shows the position taken by a mixed or dry case. There is always a partial or complete paraplegia in the dry cases, in the mixed generally partial, and the wet seldom any. I saw 14 cases of dry beri-beri at Bigoa, province of Bulacan, all ages and sexes, all in one building; complete paraplegia in 10, partial in 4, with œdema in none; all recovered in three months. General symptoms: Weakness in both legs, aching dull pain in the calves (but no acute boring pain as in multiple neuritis). Numbness in the legs only; slight pitting on pressure on both sides and along the crest of the tibia and complete or partial anæsthesia here only. The first symptoms of all forms are about the same—there is no chill or fever, no gastric or intestinal disturbances or loss of appetite. After the first week the œdema in the wet will appear; in the mixed, œdema and loss of power in the legs; in the dry, an atrophic paralysis. About the fourteenth day the neck and face swell in the wet and mixed. There are no other special symptoms except the subnormal temperature of the body and in some cases constipation.

The following table shows the temperature of 10 patients for 10 days; the first 3 are mixed, 4 wet, and the remainder dry beri-beri:

Temperature, centigrade, taken every morning.

Day.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
1	36.2	36.5	36.3	36.2	36	35.7	36	36.5	36.5	35.8
2	35.4	36	36.2	36.8	35.6	36	36.5	35.8	36.1	36.2
3	35.8	35.3	36.4	36.4	36.2	36	35.9	36.1	35.8	36
4	35.5	36	35.8	35.9	35.7	35.6	36	36.4	35.7	35.8
5	36.5	36.7	35.1	35.3	36.1	37	36	35.9	36	36.2
6	35.8	36.5	36	36.7	36.3	37	36.2	37	36.7	37.1
7	36.2	37.5	36.7	36.7	37.5	37.5	37.8	37.1	36.2	35.4
8	36	35.5	35.4	35.7	36	36.2	36.1	36.6	36	35.4
9	37.2	36.8	36.2	36	35.6	36	35.8	36.5	35.5	36.3
10	36.3	35	35.4	35.2	35.4	35.7	35.7	36	36.1	35.9

While there is no chill, the patient suffers from cold at night with the temperature of the atmosphere from 26.7 to 30° C. The swelling of the face and neck causes no pain in mastication. Many physicians diagnose this as mumps. The œdema in the legs and feet is never as extensive in the mixed beri-beri as in the wet; in the mixed there is partial paraplegia about the fourteenth day. I have not seen complete paraplegia in this variety. In the wet variety there is seldom any paralysis; there is severe pain over the heart with dyspnea after the third week in these two varieties.

The wet cases are the most dangerous; during the fourth week the pain is very severe, the tongue is heavily coated, brown in the center, and pale on the edges. In these severe cases there is usually nausea and vomiting at this stage, followed by acute gastric pain; seldom any diarrhea. About the thirtieth day these patients will not remain on their bunks, but lie on the floor rolling around in their endeavor to breathe. The death is very painful and in many cases sudden. You will find patients, whom you think convalescent at night, dead in the morning.

The symptoms of the dry cases are about the same as those of the others. Anæsthesia along the crest of the tibia, weakness of the legs, and aching in the calves. Their general condition becomes atrophic; complete or partial paraplegia; slight pain over the heart about the twentieth day; no fever; temperature subnormal. These patients generally recover. All the difficult cases have a neurotic dermatitis on both lower extremities extending to the abdomen. The blood is watery. I made special examination of the blood of 35 different patients, the results being negative, except in a few cases. Eight culture tubes were prepared with gelatine meat as a medium for fresh blood from as many patients. In the eighth tube I succeeded in growing micrococci in pairs and irregular groups. The cell was about one-fourth the size of a red blood corpuscle. These cocci were also found in the white cells, which were in excess. Of the 35 cases, 4 showed these micrococci; they were stained with gentian violet. In the blood from the cadaver the same germ was found.

The urine of 10 cases was specially examined, 5 wet, 2 mixed, and 3 dry. The quantity was normal; color, pale amber; reaction, slightly acid. Albumen, 5 per cent in 2 specimens only; sugar, none; excess phosphates in 1; excess phosphates with bile in 1; no deposit in other specimens. In 3 cases micrococci were found in pairs and irregular groups like those observed in the blood. The stain was gentian violet.

It is impossible from my observation to fix any period of incubation. You will see by the table that most of the patients had been in the prison several months. The largest number had been exposed to the same conditions the longest time and among these were the greatest number of deaths.

Of the prisoners sent away for work, some developed the disease over one month after they left. Of 7 who were employed excavating the earth from one of the rooms, 5 were taken sick with the disease in less than one week. This might indicate that the germs were in the soil, and that these men were brought under the direct influence; in these cases the period of incubation might have been only a few days.

I have made seven autopsies, as follows:

Case 1.—Wet beri-beri; sick one month; died suddenly from syncope. Maculæ and ulcers on the lower extremities and abdomen; œdema of both legs, extending to thighs. Abdomen distended with fluid; swelling of both sides of face and neck. The tissues were filled with fluid blood. Lungs normal, with no adhesions; pleural cavity partially filled with fluid. Pericardial sac was distended with fluid; heart enlarged; walls thin; both sides filled with blood; no clots. Aorta also filled with blood. Liver enlarged and congested. Kidneys normal, with no congestion. Spleen normal. Cerebral cavity filled with fluid; brain congested.

Case 2.—Wet beri-beri; died suddenly. General œdema. Maculæ and ulcers on both legs and abdomen. This patient was brought to the post guardhouse as a witness, and it was not known that he was sick. He was taken with severe dyspnea and cardiac pain, and died in four hours. The abdomen was distended with fluid; the tissues were congested; but there was very little blood in the large vessels. The pericardial sac was distended with fluid; heart enlarged and filled with liquid blood; no clots; walls thin. There were peculiar white spots on the surface of the heart. Left lung normal; right lung adherent and with tubercles in many parts; spleen enlarged to at least one-half its normal size; liver enlarged, adherent, and congested; kidneys normal. Spinal canal filled with fluid.

Case 3.—Mixed beri-beri. Some œdema of lower extremities; maculæ and ulcers of both legs and abdomen. There had been complete paraplegia. Tissues and vessels filled with fluid blood. Pericardial sac filled with fluid; heart filled with blood both sides; walls thin; no clots; aorta and venæ-cavæ filled with fluid blood. Left lung normal; right slightly adherent; very little fluid in pleural cavity. Spleen enlarged to three times its normal size. The cerebral cavity contained a large quantity of fluid; brain congested; calcareous deposits on dura mater.

Case 4.—Mixed beri-beri. General appearance as in the other cases. General congestion; heart filled with fluid blood; very little fluid in sac; no clots; left lung normal; right lung adherent and in second stage of pneumonia; the whole lung involved.

Case 5.—Wet beri-beri. Complete rigor mortis. (This is the only case in which there was any rigor mortis eight hours after death.) Œdema extensive, chiefly in lower extremities, abdomen, and face. Tissues and vessels filled with fluid blood; pericardial sac distended with fluid; heart enlarged; right side filled with fibrinous clots; left side, fluid blood only; left lung adherent, upper lobe congested; right lung in second stage of pneumonia, whole lung involved; intestines congested. Spleen enlarged to twice its normal size; liver enlarged and congested. There was partial paraplegia four weeks before death.

Case 6.—Six hours after death. Dry beri-beri. Emaciated. Vessels and tissues congested. Heart enlarged; very little fluid in the sac; both auricles contained large fibrinous clots, none in ventricles, which were filled with fluid blood. Lungs normal, no adhesions or congestions; spleen enlarged to four times its normal size; kidneys normal. Cerebral cavity contained but little fluid; brain and spinal cord congested. This patient had partial paraplegia at least two weeks before he died.

Case 7.—Dry beri-beri. Sick five weeks; partial paraplegia; no œdema. All vesels filled with fluid blood. Large quantity of fluid in pleural cavity; right lung, ormal; left lung, adherent, lower and middle lobes in third stage of pneumonia; issues breaking down and filled with exudate; pericardial sac filled with fluid; right ide of heart filled with fibrinous clots, left side with fluid blood.

It will be seen that in all these cases the pericardial sac was distended with fluid, nd the vessels filled with fluid blood.

Specimens of all the organs and of the spinal cord have been sent to the laboratory f the army for examination.

LEPROSY.

Occasionally references are found in inspection reports to the prevalence of leprosy among the natives in the vicinity of garrisoned posts. The following is from a report on the military hospital at Cebu, P. I., by Maj. L. M. Maus, sanitary inspector of the Division of the Philippines, dated July 17, 1900:

> Leprosy is a common disease among the inhabitants of this island, and many cases are found scattered along the seashore in the various pueblos. The town of Cebu contains an old leprosy hospital which was established in 1852, and is capable of caring for about 100 cases. This institution is located about one-half mile outside of the town, along the seashore. I found numerous cases of leprosy along the roadside during my visit to this lazaretto, among whom were many children, generally engaged in begging. I understand that the city ordinances do not permit lepers to enter the city, and that a deadline has been established at a certain point. The leprosy hospital was formerly allowed $1,842 annually by the Spanish Government, the deficit being made up by the friars who had charge of the institution. The hospital contains about 80 people, equally divided among the two sexes. Many of the patients are children from 8 to 14 years old. The disease appears mostly in the tuberculous form, many nodules appearing on the face and lobes of the ears. In many instances the nose had sunken. Quite a large percentage of the feet were affected, and in a number of cases the toes had gone. Beyond shelter and spare food nothing is done for these unfortunates. Colonel McClernand has constructed a large nipa barrack near the hospital, about 250 feet long and 20 feet wide, around which he intends to construct a barricade. After the completion of this he intends to segregate and take care of all the lepers in the town and its immediate environment. He has allowed 6,000 pesos annually for the support of these people, which he turns over to the priest who has charge of this work. I understand that there are between 200 and 300 lepers in Cebu and its suburbs. The work Colonel McClernand is performing is praiseworthy, but much better results could be obtained were the entire matter turned over to the medical department.

A plan for the segregation and care of the lepers of the Philippine Islands was submitted June 4, 1900, by the chief surgeon to the military governor. This met with the approval of the latter, and on June 18 an order was issued convening a board of officers to select an island suitable for the purpose and to formulate working plans for the establishment of a leper colony, including estimates for suitable buildings, for the salaries of the necessary officials and employees, and for the rations and other allowances for the support of the establishment. The board consisted of Maj. Louis M. Maus, surgeon, United States Army, Capt. George P. Ahern, Ninth United States Infantry, and Capt. W. E. Horton, assistant quartermaster, United States Volunteers.

Pursuant to instructions from the military governor, the board embarked on the U. S. gunboat *General Alava* for the purpose of visiting the islands previously selected for investigation and designated by the military governor in a letter to the admiral commanding the fleet. The islands thus designated were Lubang, Ylin, Maestro de Campo, Bantayan, Camotes, and Linapacan, all of which were visited and investigated except the last, which was stricken from the list by the naval commander, as it lay outside of the route the vessel was expected to take in the delivery of stores to the naval vessels in southern waters. The following are the conclusions submitted by the board on the completion of this voyage of inspection:

> In consideration of the large number of lepers reported in the archipelago (about 30,000), and the various racial elements represented, the board fully appreciates the difficulties in the selection of a single island for this colony. Besides its agricultural advantages, fertility of soil, variety of products, etc., an island suitable must possess a sufficient area to maintain a population of probably 40,000 people, for undoubtedly a large number of families of these unfortunates will follow them into voluntary

exile. It should also be capable of varied products such as rice, corn, potatoes, tobacco, hemp, garden vegetables, and the different fruits. An island whose main product is rice would hardly be suitable, when we consider the hard labor entailed in its culture and the character of the colonists, most of whom being weaklings. So far the board has found no suitable single island, except one containing a large or fairly large population, the compulsory removal of which might be questionable. The islands of Ylin, Maestro de Campo, and Bantayan are considered unsuitable for the following reasons: Ylin, on account of its physical features and lack of agricultural lands; Maestro de Campo, its inferior size; and Bantayan, its large population (about 20,000). Sibuyan is quite large and populous, and generally speaking is covered with mountains and forests, and contains only a small amount of agricultural land, which is well settled. While we only examined one side of the island, we do not regard it as suitable. The Camotes group, however, appear to possess all the necessary requirements for the establishment of a self-supporting colony, such as size, fertility of soil, variety of products, location, isolation, water, timber, and healthfulness. Two of these islands, Paciyan and Porro, will in all probability meet all the requirements of the colony for the next twenty-four years and be able to maintain a population of 30,000. The population of these two islands has been estimated as 13,000 people. While Lubang possesses a number of advantages—location, size, products, etc.—the board does not feel justified in coming to definite conclusions in regard to its suitability without further investigation, but it is believed capable of supporting a population of 20,000 were the resources of the island developed. General Kobbe, of the Army, and Captain Bleeker, of the Navy, highly recommend the island of Cagayan de Sulu (Jolo) for the colony. This island is situated on the extreme southwestern portion of the archipelago, north of Borneo; is about 6 miles in length and width; contains about 2,000 Moros; is said to be fertile, cool, healthy, and otherwise suitable. The bishop of Cebu very strongly recommends the island of Sikujor, a large island lying north of Mindanao, but it is said to contain a population of 40,000 people. Professor Worcester speaks very highly of the Kalamianes group, which lies on the twelfth parallel, about 50 miles southwest of Mindoro. This group contains the islands of Busuanga and Caleon, besides a number of small islets. Professor Worcester, who has visited them several times, informed us that they were fertile, healthy, and very sparsely inhabited. The board would have visited them during the trip had it not been contrary to orders received by the commanding officer of the ship. In conclusion, the board deems it best that its final action in regard to selection be deferred until the Kalamianes group and the islands of Cagayan de Sulu be examined and Lubang more fully investigated. Should the removal of the population of the island of Sikujor be not considered objectionable, it also recommends that it be included in the list for examination.

The subject was again taken up on January 3, 1901, by the issuance of an order from the office of the military governor directing the board to inspect the islands of Culion, Busuanga, and Cagayan de Jolo, and to make such further examination of the island of Tubang as might be deemed necessary. The board was called upon on its return to Manila to report not only on a suitable site for a leper colony, but on the relative advantages of each of the islands visited for the establishment of a penal colony. Transportation having been provided by the gunboat *General Alava*, the board made its second voyage of inspection, and on its return to Manila submitted a full report, the conclusion and recommendations of which were as follows:

> Including those examined on a previous visit of the board, July 5 to 24, 1900, the following islands so far have been inspected and considered: Bantayan, Busuanga, Cagayan de Jolo, Campo de Maestro, Culion, Comotes, Cuyo, Ylin, Linapacan, Lubang, and Sibuyan. All of these islands have been visited once by the board and examined with more or less care, Lubang having been visited twice. In consideration, however, of the brief period allotted the board, less than one month for both visits, it will be readily understood that but little time could be devoted to the close inspection of each island. After having carefully considered the special or superior advantages of each island inspected for the purpose of establishing a colony for lepers the board unanimously recommends Cagayan de Jolo. This island is believed to possess all the qualifications required—size, fertility of soil, variety of products, healthfulness, and geographical location. Its unique position in the archipelago and distance from other islands peculiarly fit it for this purpose. Besides, its selection would

disturb few people and practically involve no property interests, since the population consists only of a few hundred semicivilized Moros, who apparently claim nothing more than the sites upon which their huts are located. If the selection of this island as a colony for the segregation of the lepers of the archipelago meets with the approval of the governing authorities, the board recommends that immediate steps be taken to place it in condition for their reception. It is believed that the appropriation of $25,000 Mexican currency would be sufficient to place the island in a suitable condition for the reception of lepers now confined in the various lazarettos on the island. The present occupants should be removed to Palawan, or the Jolo group, which it is believed could be done with little expense. It is not regarded advisable at present to submit estimates for the erection of permanent buildings or the construction of roads, wharves, water system, and other expensive improvements. The huts now occupied by the natives could be utilized by the less serious cases, while the nipa barrack should be constructed for those requiring constant care. In addition to the barrack or hospital a few buildings should be erected for the use of the superintendent, physicians, druggist, school-teachers, foremen, padre, and employees, and a large go-down for supplies and stores, these buildings to be constructed of material similar to that used in the buildings now on the island. It is believed that 1 superintendent, 2 native physicians, 1 school-teacher, 2 foremen, and 25 laborers, including carpenters, would be sufficient to start the colony.

The suitability of the various islands examined, for the establishment of a penal colony, depends on the rules instituted for its government. Should it be intended simply as a place for isolation and detention, in penitentiaries and stockades, in all probability the island of Penon de Coron would be most suitable.

On the other hand, should it be intended to establish a colony where the labor of the convicts could be utilized in chain gangs for the cultivation of the soil, felling timber, building of roads, etc., it is believed that Busuanga would prove best adapted.

On account of its isolation and fertility Cagayan de Jolo is also admirably suited for this colony, but would serve a better purpose for the segregation of the lepers.

On account of Cuyo's large population and Linapacan's physical features, these islands can not be considered. Culion is rich, fertile, and would be well adapted, provided the colony was limited in number. The establishment of the colony on Lubang would in all probability entail the expenditure of large sums to pay for property owned by the church and private individuals and for the removal of the present population, unless it was intended to construct penitentiaries there for the confinement and isolation of the convicts.

On account of the favor with which the island of Cagayan de Jolo was regarded by the board, the following from the report on this island is submitted:

> This beautiful little island lies in 70° N. latitude and 118° 30′ E. longitude, is about 8 miles long from east to west and 5 miles broad from north to south. Except for a few small islets, Cagayan de Jolo occupies a very isolated position, lying as it does in the center of the Mindoro Sea, almost midway between Palawan on the west and the Sulu group on the east. It is about 75 miles north and east of Borneo. The surface of the island, generally speaking, consists of gently undulating plains, covered with a heavy growth of cojon, with here and there a large tree or a small grove of cocoanut trees, which add immensely to the picturesqueness of the landscape. To the west and south the terrene gradually ascends to elevations which might be designated as mountains, though it is a question whether any point rises higher than 1,000 feet above the sea level. The soil appears rich, is reddish in color, and contains loam, clay, and sand. Although very little in the way of agricultural development has taken place, it is believed that the island is highly susceptible of cultivation, and that almost everything grown elsewhere in the archipelago can be raised here—cocoanuts, bananas, oranges, cajeles, corn, sweet potatoes, gabe, cocoa, rice, sugar cane, hemp, cotton, and all kinds of garden vegetables. Cocoanut trees were observed growing luxuriantly on the highest ranges of hills. There were evidences of sugar plantations long since overgrown with rank growth of cojon. The inhabitants consist of about two or three hundred uncivilized Moros, who live in thatched huts in the most primitive way. They cultivate very little ground, and appear to subsist principally on fruits, roots, fish, and mollusks. Their houses are small, low, and generally consist of one apartment, which contains very little in the way of furniture or household articles, and are very dirty. An occasional cow or carabao and a few chickens were noted on the island. We met a few of the natives, but as they were unable to speak any language that was intelligible to any member of our party, which included Spanish, Tagalo, and Visayan, we were unable to communicate with them. They are lazy, indolent, and semicivilized, and should be placed very low in the scale of humanity. It is questionable whether a single inhabitant of the island can read or

write. All the males were armed with well-kept and sharpened boronga and lances, from which they could not be induced to part for any money consideration. As far as we were able to learn no running streams were found to exist in the island, certainly none on the plains, though there may be some in the mountain districts. The drinking water is procured from wells. A spring has been reported by sailing masters to exist on the south and west shore of the island. The craters of two large and extinct volcanoes exist on the southern shore, the other being perfectly landlocked, though equally filled with water, which appears to be on a level with the sea. Both of these lakes are very deep, and the interior one is said to contain fresh water.

There appears to be no good harbor in the island, and the shore is surrounded by a coral reef, which extends out from one-half to 1 mile, except on the northwest and southeast coast. Good anchorage for ordinary commercial vessels can be obtained within 500 yards off the south shore near the two volcanic lakes. The best anchorage during the northeast monsoon is on the west side of the island, where an anchorage can be obtained in 9 or 10 fathoms.

INJURIES.

The admission, discharge, and death rates from injuries in the Army as a whole in 1900 were, respectively, 196.27, 4.89, and 6.95 per thousand of the strength, as compared with 192.47, 4.47, and 6.67 in 1899, and 232.75, 3.10, and 2.74, the mean annual rates of the decade 1889–1898. The troops in China, Cuba, and the United States had larger admission rates than the rate of the Army as a whole; those in the Philippines and Porto Rico had smaller rates. The discharge rate and death rate in China were unusually high, as also was the death rate among the volunteers in the Pacific Islands.

Table showing the number of admissions, discharges, and deaths caused by the prominent classes of injury, with the ratios per thousand of strength, among the troops serving in the United States and among those on insular or foreign service, year 1900.

Place of service and causes of admission.	Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Army:						
Contusions and sprains	7,572	75.42	4	0.04	....	....
Abrasions, blisters, burns, and scalds	2,515	25.05	....	....	1	0.01
Wounds, contused, lacerated, and punctured	2,352	23.43	6	.06	5	.05
Wounds, gunshot	1,173	11.69	235	2.34	471	4.69
Total injuries	19,703	196.27	491	4.89	698	6.95
United States:						
Contusions and sprains	2,761	133.43	2	.10	....	....
Wounds, contused, lacerated, and punctured	777	37.55	3	.14	2	.10
Total injuries	5,547	268.10	140	6.77	61	2.95
Cuba:						
Contusions and sprains	1,249	143.72	1	.12	....	....
Wounds, contused, lacerated, and punctured	366	42.12	1	.12	....	....
Wounds, gunshot	29	3.34	5	.58	3	.35
Total injuries	2,493	286.88	29	3.34	12	1.38
orto Rico:						
Contusions and sprains	24	11.01	....	....	....	....
Wounds, contused, lacerated, and punctured	42	19.27	....	....	....	....
Wounds, gunshot	12	5.50	1	.46	....	....
Total injuries	393	180.27	3	1.38	....	....
hina:						
Contusions and sprains	100	51.36	....	....	....	....
Exhaustion from exposure and fatigue	97	49.82	....	....	1	.51
Wounds, gunshot	182	93.47	38	19.52	42	21.57
Total injuries	627	322.03	40	20.54	47	24.14
acific Islands (volunteers):						
Contusions and sprains	1,440	45.81	1	.03	....	....
Abrasions, blisters, burns, and scalds	990	31.50	....	....	....	....
Wounds, gunshot	609	19.37	50	1.59	255	8.11
Total injuries	5,288	168.23	87	2.77	354	11.26
cific Islands (regulars):						
Contusions and sprains	1,811	51.09	....	....	....	....
Abrasions, blisters, burns, and scalds	760	21.44	....	....	1	.03
Wounds, gunshot	281	8.01	119	3.36	150	4.23
Total injuries	5,355	151.06	192	5.42	214	6.04

RADICAL CURE OF HERNIA.

The following operations for the radical cure of hernia were performed or reported during the year ending June 30, 1901:

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
A. E.	Pvt., D, 5th Inf	22	Right inguinal	June 29, 1900	W. H. Block, contract surgeon, U. S. A.
H. J. Y	Elect. Sergt	25	Left inguinal	July 18, 1900	Maj. W. C. Borden, surgeon, U. S. A.
P. P. F	Pvt., B, 4th Art	24	Right inguinal	July 23, 1900	
J. F. L	Civilian	36	Left inguinal	Sept. 11, 1900	
C. A. L[1]	Pvt., Hosp. Corps	21	Right inguinal	Sept. 18, 1900	
F. D	Pvt., O, 4th Art	37	Left inguinal	Sept. 25, 1900	
J. C. C	Pvt., D, 7th Art	21	Double inguinal	Oct. 5, 1900	
W. F. S	Rect., unassigned	22	Right inguinal	Oct. 19, 1900	
G. P. M	Civilian	21	Double inguinal	Oct. 23, 1900	
A. H	Pvt., F, 2d Art	24	do	Oct. 26, 1900	
G. W. B	Sergt., F, 7th Art	29	Right inguinal	Nov. 9, 1900	
G. J. N	Capt. Med. Dept	36	Double inguinal	Nov. 23, 1900	
A. S. B	Sergt., K, 4th Art	25	Left inguinal	Dec. 21, 1900	
W. F. S. L	Pvt., D, 19th Inf	31	do	Dec. 28, 1900	
J. H. G	Pvt., D, 7th Art	22	Right inguinal	Jan. 25, 1901	
R. P	Pvt., 37th Co. C. Art	47	Left inguinal	Feb. 22, 1901	
F. G	Pvt., A, 8th Inf	22	Right inguinal	Nov. 14, 1900	Capt. A. E. Bradley, assistant surgeon U. S. A.
E. K. J	Pvt., Hosp. Corps	31	Ventral	Dec. 4, 1900	
W. J. McC	Pvt., F, 1st Cav	47	Left inguinal	Jan. 14, 1901	
J. L. O'C	Pvt., I, 10th Inf	25	Right inguinal	Sept. 7, 1900	
G. H	Pvt., I, 10th Cav	....	do	Oct. 25, 1900	Maj. L. C. Carr, surgeon, U. S. V.
C. B	Pvt., C, 45th Vol. Inf	24	Left inguinal	Jan. 29, 1901	First Lieut. C. R. Darnall, assistant surgeon, U. S. A.
A. B. B	Corpl., F, 31st Vol. Inf	23	Right inguinal	Feb. 11, 1901	
C. M. T	Pvt., H, 31st Vol. Inf	30	do	do	
H. H	Pvt., B, 5th Cav	29	Double inguinal	Sept. 10, 1900	Capt. C. E. B. Flagg, assistant surgeon, U. S. A.
J. F. S	Sergt., A, 2d Inft	....	Ventral	do	Capt. E. B. Frick, assistant surgeon, U. S. A.
R. B[1]	Pvt., B, 16th Inf	....	Right inguinal	July 28, 1900	Lieut. Col. A. C. Girard, deputy surgeon-general, U. S. A.
F. C	Pvt., C, 18th Inf	....	Left inguinal	Aug. 6, 1900	
A. A. C	Pvt., Hosp. Corps	....	Right inguinal	Aug. 18, 1900	
J. G	Pvt., A, 18th Inf	....	do	July 26, 1900	
G. G	Civilian	....	Left inguinal	Aug. 15, 1900	
J. A. J	Sergt., A, 35th V. I	....	Right inguinal	Aug. 8, 1900	
R. G. L	Pvt., A, 4th Cav	....	Left inguinal	Aug. 1, 1090	
C. C. P	Act. hosp. steward	....	Double inguinal	Aug. 21, 1900	
R. R	Pvt., K, 35th V. I	....	Right inguinal	Aug. 16, 1900	
R. B. S	Civilian	....	Left inguinal	July 28, 1900	
G. W. S	Pvt., F, 33d V. I	....	do	Aug. 9, 1900	
O. S	Pvt., M, 7th Inf	....	Right inguinal	Aug. 22, 1900	
E. A	Mus., A, 18th Inf	....	Left inguinal	Nov. 12, 1900	
J. A. G	Pvt., H, 27th V. I	....	do	Oct. 21, 1900	
H. R. G	Pvt., H, 6th Art	....	Ventral	Oct. 17, 1900	
C. H	Pvt., I, 35th V. I	....	Right inguinal	Oct. 2, 1900	
R. LaP	Pvt., Hosp. Corps	....	do	Oct. 3, 1900	
R. W. P	Corpl., M, 9th Cav	....	do	Sept. 19, 1900	
G. S	Civilian	11	do	Oct. 21, 1900	
C. E. S	Pvt., M, 19th Inf	....	do	Sept. 17, 1900	
F. M	Pvt., M, 29th V. I	....	Ventral	Feb. 13, 1901	
J. T	Discharged soldier	....	Double inguinal	Jan. 8, 1901	
R. R. A	Pvt., Bd., 32d V. I	....	Left inguinal	Feb. 9, 1901	
G. A	Discharged soldier	....	Right inguinal	Dec. 27, 1900	
Z. W	Pvt., H, 29th V. I	....	do	Feb. 7, 1901	
T. S	Discharged soldier	....	Ventral	Jan. 9, 1901	
J. L	Pvt., A, 21st Inf	....	Left inguinal	Dec. 12, 1900	
F. D	Discharged soldier	....	do	Dec. 19, 1900	
J. G	Pvt., L, 4th Cav	....	do	Dec. 6, 1900	
C. B	Discharged soldier	....	Ventral	Feb. 23, 1901	
C. F	do	....	Right inguinal	Feb. 12, 1901	
S. W	Civilian	....	Left inguinal	Mar. 1, 1901	
G. C	Pvt., E, 5th Art	37	Right femoral	Jan. 30, 1901	Capt. D. C. Howard, assistant surgeon, U. S. A.
F. A. K[1]	do	27	Right inguinal	Feb. 15, 1901	
J. W. Van N	Pvt., K, 1st Art	....	Left inguinal	Dec. 18, 1900	J. S. Kennedy, contract surgeon, U. S. A.
B. D. J	Pvt., A, 10th Cav	29	Right inguinal	Feb. 22, 1901	First Lieut. Ira M. Shimer, assistant surgeon, U. S. A.
W. B	Corpl., D, 7th Cav	22	do	Dec. 4, 1900	Capt. A. N. Stark, assistant surgeon. U. S. A.
G. A. J	Pvt., H, 2d Art	....	do	Jan. 26, 1901	
C. L	Pvt., E, 2d Cav	23	Ventral	Sept. 20, 1900	First Lieut. J. Hamilton Stone, assistant surgeon, U. S. A.
J. B	Civilian	12	Double inguinal	Jan. 9, 1901	
P. F	Pvt., I, 2d Cav	22	Left inguinal	Aug. 7, 1900	

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[1] Recurrence of hernia.

In September, 1895, after fully considering the results attained by surgical treatment in the radical cure of hernia, together with the small amount of risk involved in the operation as now conducted under careful aseptic supervision, I came to the conclusion that the operation might be made available to preserve good soldiers, although ruptured, in the service, and to lessen the number of men discharged for disability and then pensioned for hernia. The annual loss of men by rupture has always been considerable. During the six calendar years ending December 31, 1894, 153 men were discharged. I did not consider that the progress of surgery warranted a resort to operative proceedings in all cases, but felt confident that surgical interference would enable many to continue in the military service or earn their livelihood with comfort in civil life who are now discharged and pensioned for hernia. Accordingly, on September 9, 1895, the following was published from Headquarters of the Army, Adjutant-General's Office, as Paragraph II of Circular No. 9, of that date:

II. Treatment of enlisted men who have been ruptured in the line of duty.

Cases of hernia suitable for an operation should receive surgical treatment, which, by the most approved modern methods, is successful in a large proportion of the cases operated upon, and in skillful hands is attended with little risk.

Operations for the radical cure of hernia will be performed, with the consent of the soldier, by medical officers specially designated by the Surgeon-General of the Army.

Medical officers will report cases of hernia considered favorable for operation to the Surgeon-General.

If the case is considered unsuitable for operation, or if an operation is declined by the soldier, the fact will be noted upon the certificate of disability. (Decision Acting Secretary of War, August 14, 1895, 19166, A. G. O., 95.)

Since then 336 men belonging to the Regular Army have been operated on for the radical cure of hernia. Medical officers have reported also 71 cases among civilians and 59 cases among volunteer troops.

Of the 71 cases among civilians the records show that the patients varied in age from 5 to 64 years, but most of them were cases of inguinal hernia in discharged soldiers. Sixty-nine left the military hospital cured or in good condition at the end of from eighteen to one hundred and five days, but the records are unsatisfactory, as they do not follow up the subsequent histories. How many recurrences may have taken place is unknown. Of the 69 cases, 3 were double operations on inguinal hernia, 1 was a case of umbilical hernia in a female 28 years of age, and 2 were cases of hernia at the site of operations for appendicitis respectively nine and ten months prior to the hernial operation. In 1 of the 69 cases the patient, a discharged soldier, aged 42, is now drawing a pension of $6 per month for tender cicatrix—"Hernia cured, but suffers from pain in cicatrix, which occasionally suppurates."

Two untoward results occurred in these 71 cases: A patient 61 years of age died from profound shock on the day following the operation. The other, a discharged soldier, died from congestion of the lungs three days after the hernial operation. He had just returned from the Philippines and had been dissipating heavily in San Francisco prior to the operation.

Fifteen of the 71 cases were operated upon by Col. W. H. Forwood, assistant surgeon-general, United States Army; 14 by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army, and 9 by Maj. W. C. Borden, surgeon, United States Army.

The 59 cases among the volunteer troops were reported chiefly from

Washington, D. C.; San Francisco, Cal., and Santiago, Cuba, Col. W. H. Forwood, assistant surgeon-general, and Maj. W. C. Borden, surgeon, United States Army, being the operators at the first-mentioned station; Lieut. Col. A. C. Girard, deputy surgeon-general, at the second, and Maj. L. C. Carr, surgeon, United States Volunteers, at the last. Of this series all were cases of inguinal hernia except one—a protrusion at the site of an operation for appendicitis performed one year prior to the operation for the rupture. One of the cases was a double inguinal operation. One case, operated on March 20, 1899, was discharged by order "hernia disabled" April 10, 1899, the short time elapsing between the operation and the discharge leaving it uncertain as to whether the operation was ultimately a success or a failure. The men in two other instances were mustered out shortly after the operation, with disability marked "one-fourth" in one instance and "total" in the other. Of the remaining 56 cases all were reported as in good condition at the time of muster out or other discharge from service at periods varying from thirteen days to six months and twenty-one days after operation. It has not been practicable to follow up the histories of these cases.

We have, however, a very satisfactory knowledge of the condition of the 336 cases of men belonging to the Regular Army operated on for the radical cure of hernia—gained from the muster rolls and medical records, and, in many instances, by special inquiries. Of these 336 cases no recurrence of the hernia or bad effect from the operation has been reported in 300. In 99 of the 300 a period of six months or less has elapsed since the operation was performed; in 50 a period of six to twelve months, in 80 a period of one to two years, and in 71 a period of over two years. This must be regarded as a very satisfactory result of surgical intervention to save trained soldiers for a continuance of their military career, particularly when it is recognized that 10 of the remaining 36 cases were radically cured by a second operation, 13 were discharged for disability, they having declined to submit to a second operation, 6 for tender cicatrix resulting from the operation, and 2 for weakness of the abdominal wall, rendering them unfit for the arduous duties of the military service; 4 were retained in service, and 1 case terminated fatally from suppression of urine.

Among these 36 cases, to which special attention is invited, recurrence of the hernia was reported in 21 cases at varying periods after the operation. In 10 cases within six months (mean, three and a half months); in 4, within six to twelve months (mean, eight months); in 5 within one to two years (mean, fifteen months); and in 2 after two years (mean, twenty-nine months). Of the 10 cases in which recurrence took place before six months had elapsed, 5 cases (Nos. 18, 107, 234, 244, and 253) were discharged on surgeons' certificates of disability; but in the 4 cases (Nos. 52, 84, 240, and 252) a second operation was successful, so far as shown by the records, and in the remaining case (No. 201) the patient, an old soldier, was placed on the retired list.

Of the 4 cases of recurrence between six and twelve months after the operation, 2 cases (Nos. 70 and 254) were discharged on certificates of disability; Nos. 80 and 210 remained in service.

Of the 5 cases of recurrence between one and two years after operation, 1 (No. 68) was discharged for disability, but in 4 (Nos. 105, 155, 218, and 267) a second operation was successful.

Of the 2 cases of recurrence after two years or longer, 1 case (No.

42) remains in service, and the other case (No. 121) was discharged for disability.

Thus of the 21 cases of failure in the primary operation in 336 operations, the men in 9 cases were discharged for disability, a second operation not having been undertaken, 8 were returned to effective duty after a second operation, and 4 were retained in service in no worse condition than before the unsuccessful operation.

There were also 2 cases (Nos. 276 and 328) in which it can scarcely be said that a recurrence took place, but rather that the primary operation was unsuccessful. In one of these cases a second operation appears to have been performed, and in the other a third operation before a cure was effected.

Among the 36 cases, 23 of which have already been noted, there were 4 cases that must be regarded as unsuccessful (Nos. 7, 43, 91, and 108) as the patient in each case was discharged from hospital, declining a second operation, on certificates of disability for rupture. Six cases (Nos. 36, 49, 53, 54, 231, and 246) must also be regarded as unsuccessful, for the men were afterwards discharged on certificates of disability for tender cicatrix. In 2 cases (Nos. 95 and 167) although the result was good so far as concerned the cure of the rupture, the men were discharged from the service on account of weakness of the abdominal walls. The case of death (No. 170) is specially reported below.

THE THIRTY-SIX SPECIAL CASES.

Case 7.—Discharged on certificates of disability for inguinal hernia and swollen and sensitive testicle after four months of hospital treatment subsequent to the operation.

Case 18.—Recurrence four months and three days after operation or one month after leaving hospital. Discharged on certificates of disability; declined a second operation.

Case 36.—Discharged on certificates of disability for tender cicatrix, etc., over twelve months after the operation, during most of which time he was under treatment in hospital.

Case 42.—Recurrence twenty-eight months after operation or twenty-five months after leaving hospital. The patient in this instance was an officer, who is still in the service.

Case 43.—Discharged on certificates of disability four months after the operation. During most of this time he was under treatment in the hospital.

Case 49.—Discharged on certificates of disability for tender cicatrix four and one-half months after the operation or about two months after leaving hospital.

Case 52.—Recurrence from strain May 22, 1900, three and one-half months after operation. A second operation was performed June 26, 1900. No recurrence.

Case 53.—Discharged on certificates of disability for painful cicatrix four and one-half months after operation and two and one-third months after leaving hospital.

Case 54.—Discharged on certificates of disability for painful cicatrix seven months after operation and two months after leaving hospital.

Case 68.—Recurrence twelve and one-third months after operation or ten and one-half months after leaving hospital for duty. Patient declined a second operation and was discharged on certificates of disability fifteen days later.

Case 70.—Recurrence nine and one-half months after operation or eight and one-third months after returning to duty. He declined a second operation and was discharged on certificates of disability eleven days later.

Case 80.—Recurrence eight and one-half months after operation or four months after leaving hospital for duty. The patient in this case, a commissioned officer, refused a second operation and is now in service wearing a truss.

Case 84.—Recurrence by probable carelessness of patient seven weeks after operation and twelve days after leaving hospital. A second operation was immediately performed. An examination April 27, 1901, nine months after this operation, found the parts sound and with no disposition for the hernia to recur.

Case 91.—Operation not successful. Patient discharged on certificates of disability for hernia.

Case 95.—An operation for hernia in the cicatrix of an appendectomy. Result reported good so far as concerns the hernia, but the soldier was discharged on certificates of disability for "weak abdominal walls."

Case 105.—First operation December 12, 1895; second operation for relapse February 3, 1897. No recurrence up to December 3, 1897, when the man deserted.

Case 107.—Recurrence two and one-fifth months after operation or seventeen days after leaving hospital for a status of duty. A second operation declined. Discharged on certificates of disability for hernia.

Case 108.—Operation unsuccessful. Discharged on certificates of disability for hernia after nearly nine months in hospital.

Case 121.—Operation February 22, 1897; returned to duty March 20, 1897. No special report of the recurrence, but the Adjutant-General's records show the man to have been discharged September 2, 1899, on certificates of disability for hernia.

Case 155.—Operation March 28, 1899; discharged by order May 9, 1899. Reenlisted. Recurrence December 6, 1900. Second operation December 17, 1900; to duty February 1, 1901. No recurrence as yet reported.

Case 167.—Discharged on certificates of disability for weakness of the abdominal wall eight weeks after an operation for a hernia at the site of previous operations on the appendix.

Case 170.—As death occurred in this case, the report of the operator is given in full. I have the honor to submit the following report in the case of Private C. O. M., Third Cavalry, who was operated on for hernia at this hospital May 30, 1900, and died of acute nephritis on June 6, 1900:

Private M. reported at this hospital from Fort Totten, N. Y., per instructions from the Adjutant-General's Office, dated May 10, 1900, for operation for the radical cure of hernia, his diagnosis being "double inguinal hernia," contracted in line of duty while serving in Cuba in 1898. He was placed under observation preparatory to operation. On May 17 and 21 he had slight attacks of tertian malarial fever, his temperature rising to 102. The malarial parasite was found in his blood. Operation was deferred to insure cure of the disease before subjecting the patient to a surgical procedure. On May 26 he was discharged from the service, and reenlisted on May 28 for the Third Cavalry. At the time of his discharge he was allowed to leave the hospital to settle his final statements, and from what was learned afterwards he indulged quite freely in alcoholic liquors and had sexual intercourse, from which the gonorrhea, which subsequently developed, was contracted. On his return to the hospital he appeared to be in good condition, and I operated on May 30, doing a double operation, as he had indirect inguinal hernia on both sides. Post operative temperature was quite high, reaching 103 degrees in the afternoon of the day of the operation. He passed 12 ounces of urine that night, and the next morning his temperature dropped to 99 degrees. On May 31, the day after the operation, he passed 24 ounces of turbid urine. He appeared to be in fair condition, his temperature in the evening being 98.6. The next day his morning temperature was subnormal, 96.2. There was a profuse discharge from the urethra, in which numerous gonococci were found, and on inquiry the patient gave the history of the possible venereal infection before referred to. His urine had diminished in quantity, 12 ounces in 24 hours, and microscopical examination showed a great many blood cells with granular and epithelial casts. His temperature in the evening was 99.6. On June 2 and 3 he had practically suppression of urine, but a few drops being passed, and catherization showing none in the bladder. On June 4, 5, and 6 he passed about 3 ounces each day. The gonorrheal discharge was very profuse. His pulse rate was low, never rising above 86 after the operation. There was no indication of infection or septicæmia as a result of the operation. The trouble appeared to be entirely confined to the kidneys. The usual treatment for acute nephritis was adopted, but without result, and the patient died on the morning of June 6, seven days after the operation.

An autopsy was made by Dr. Lamb, of the Army Medical Museum, and the following conditions were disclosed: Body that of a well-nourished man in the prime of life. The dressings were removed from the operation wounds, and they were found to be united by first intention, without a trace of suppuration or inflammation. The thorax and abdomen were opened. The heart and lungs were normal; the peritoneum was normal, there being no evidence of peritonitis or infection; the liver was normal; the spleen enlarged to twice the normal size, and of dark slate color; both kidneys enlarged, together weighing 18 ounces, multiple cortical hemorrhages and œdema in each; the capsule was adherent in places, and on section of the kidneys they were found to be greatly congested, and presented every appearance of acute hemorrhagic nephritis. The kidneys are now in the Army Medical Museum, No. 11984.

The site of operation was carefully examined. The union of the tissues, as sutured together in Bassini's operation, was found to be firm. It was interesting to note that on the inner surface of the abdomen, to the point where the neck of the sac existed, the high ligation of the sac practiced in operation had entirely obliterated any depression in the inner surface of the abdomen, showing that the high ligation, as practiced in Bassini's operation, removes the depression in the inner surface of the abdomen at the internal ring, and so does away with this predisposing cause of hernia.

The autopsy confirmed the diagnosis and showed that death was due to acute hemorrhagic nephritis, but the question was left in doubt as to whether the nephritis was due to the gonorrheal infection, to the ether used in anæsthesia, or to irritation of the kidneys by alcoholic excess in which the patient indulged when he was discharged, or to a combination of these factors.

Case 201.—Operation October 10, 1897, for double inguinal hernia; returned to duty February 1, 1898. A small incomplete ventral hernia on right side was reported April 16, 1898. This man, an old soldier, was placed on the retired list May 14, 1899.

Case 210.—Recurrence nearly seven months after operation. In service, wearing a truss.

Case 218.—Recurrence nearly fourteen months after operation. Second operation five days later, on August 28, 1900; no recurrence reported.

Case 231.—Discharged five and one-half months after operation, on certificates of disability for weak abdominal wall, with persistent pain at site of the injury.

Case 234.—A double operation on April 23, 1900; to duty May 28 following. Recurrence on left side July 29, on right side October 16. Discharged December 24, 1900, on certificates of disability for recurrent double hernia and syphilis.

Case 240.—Recurrence six months after operation. A second operation performed; present for duty in the Philippines February 28, 1901, seventeen and one-half months after second operation.

Case 244.—Recurrence three months after operation or one and one-third months after leaving hospital. Discharged on certificates of disability for hernia.

Case 246.—Discharged on certificates of disability five and one-half months after operation for neuralgia of inner side of thigh and scar following operation.

Case 252.—Operation May 9, 1899; duty June 12, 1899; recurrence in two months. Truss worn until second operation, February 16, 1901. To duty April 8, 1901.

Case 253.—Recurrence five months after operation or three and one-half months after leaving hospital. Discharged on certificates of disability for hernia.

Case 254.—Discharged on certificates of disability for hernia six and one-half months after operation or four and one-half months after leaving hospital.

Case 267.—Recurrence fifteen months after operation or thirteen months after leaving hospital. A second operation performed October 13, 1900; duty in sixty-three days.

Case 276.—Operation October 7, 1899, continuous treatment in hospital until a second operation was performed January 13, 1900; to duty April 16, 1900. No recurrence reported.

Case 328.—Operation June 20, 1900, at Dagupan, P. I. Continuous treatment until a second operation was performed, also at Dagupan, August 20, 1900. A third operation was performed at the First Reserve Hospital, Manila, P. I., January 18, 1901. "Remaining without recurrence on the hospital ship *Relief*, May 31, 1901."

In this tabulation of 336 cases the principal operators were Maj. W. P. Kendall, surgeon, United States Army, who reported 58 cases; Maj. W. C. Borden, surgeon, United States Army, 53 cases; Maj. J. M. Banister, surgeon, United States Army, 36 cases; Lieut. Col. A. C. Girard, deputy surgeon-general United States Army, 30 cases, and Col. W. H. Forwood, assistant surgeon-general, United States Army, 26 cases.

Since the tabulation was made the following cases have been operated on or reported:

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
W. S. C	Civilian	26	Left inguinal	Apr. 7, 1901	Maj. W. C. Borden, surgeon, U. S. A.
G. H	Corpl., 6 Co., C. Art.	23	Right inguinal	Apr. 23, 1901	
R. C	Pvt., 41 Co., C. Art	25	do	Apr. 28, 1901	
E. W	Pvt., Bd., 4th Art	51	Left inguinal	May 14, 1901	
J. J. M	Civilian	20	Right inguinal	June 4, 1901	
A. R	2d Lt., 8th Cav	24	do	do	
H. L	Sgt. N. C. S., 26th V. I.	27	do	June 28, 1901	
H. J	1st Sgt. 27th V. I	23	do	do	
G	Pvt. K, 3d Inf	29	do	June 10, 1901	First Lieut. P. C. Fauntleroy, assistant surgeon, U. S. A.

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
H. T	Q. M. employee	.....	Right inguinal	Mar. 25, 1901	Lieut. Col. A. C. Girard, deputy surgeon-general, U. S. A.
W. G	Pvt., A., 33d V. I	.....	Ventral	Mar. 13, 1901	
J. P	Corpl., L, 36th V. I	.....	Right inguinal	Mar. 14, 1901	
W. H. C	Pvt., B, 26th V. I	.....	do	Apr. 30, 1901	
P. R. B. C	Pvt., B, 28th V. I	.....	do	Apr. 23, 1901	
E. F	Pvt., I, 4th Cav	.....	do	Apr. 16, 1901	
J. B., jr	Civilian	5	do	May 27, 1901	
E. S	Tpt. Bd., 3d Art	.....	Left inguinal	May 25, 1901	
G. M. S	Pvt., B, Engrs	.....	Right inguinal	May 1, 1901	
C. W. C. N	Civilian	40	do	Apr. 30, 1899	Maj. L. A. La Garde, surgeon, U. S. A.
C. McL.[1]	Late Pvt. B, 5th Inf	31	do	June 22, 1899	
J. H. G	Late Co. M, 3d Art	48	do	Nov. 21, 1899	
R. S	Late Co. G, 16th Inf	58	do	Sept. 22, 1900	
M. W	Late Co. F, 2d Inf	42	Left inguinal	Dec. 18, 1900	
F. A. T	Late Hospl. Corps	34	Right inguinal	Dec. 15, 1900	
W. E. T	do	27	do	Mar. 22, 1901	
F. C. P	Pvt. F, 2d Cav	25	Left inguinal	June 20, 1901	First. Lieut. J. Hamilton Stone, assistant surgeon, U. S. A.
R. M	Pvt., B, 14th Cav	21	Right inguinal	May 8, 1901	Maj. Charles E. Woodruff, surgeon, U. S. A.
E. K. W	Corpl., A, 14th Cav	22	do	May 15, 1901	
H. S.[2]	Corpl., H, 3d Art	37	do	May 31, 1899	Col. W. H. Forwood assistant surgeon general, U. S. A.
M. McC.[2]	Female civilian	.....	.....	Oct. 25, 1899	
W. S.[2]	Pvt., 1st Mont. Vols	.....	Right inguinal	May 31, 1899	
R. B	Pvt., B, 6th Cav	23	Left inguinal	Feb. 9, 1900 and June 26, 1900.	Maj. Charles Richard, surgeon, U. S. A.
I. C. C	Hospl. steward	44	Double inguinal	Nov. 8, 1900	
W. A	Corpl., L, 1st Inf	22	.....	Apr. 11, 1901	
J. A	Pvt., M, 1st Inf	38	Right inguinal	June 18, 1901	
J. L	Pvt., C, 8th Cav	19	do	June 26, 1901	

[1] Reenlisted.

[2] No special report on file in this office covering these cases.

STERILIZATION OF ANIMAL LIGATURES AND OF SEA SPONGE.

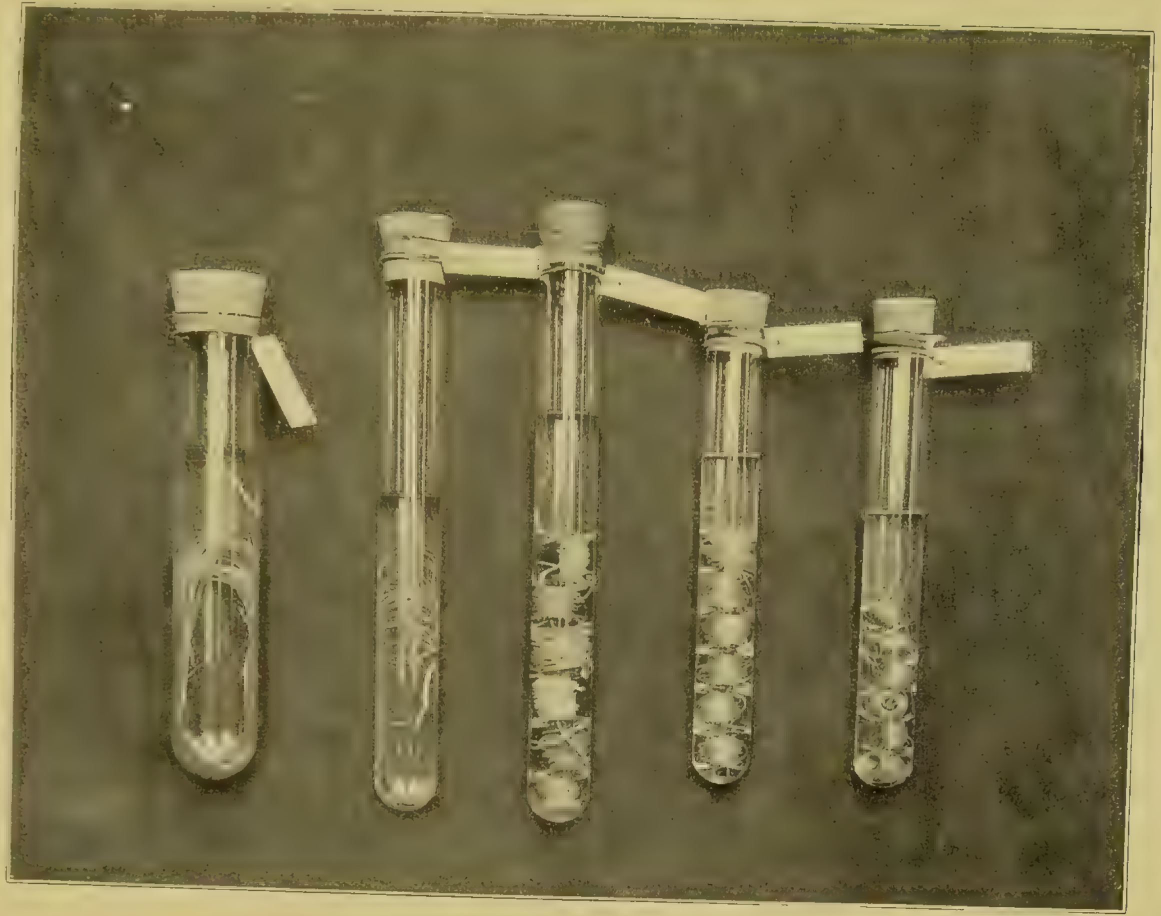
In connection with these operations for hernia and other surgical proceedings, Col. W. H. Forwood, assistant surgeon-general, United States Army, has submitted his methods for the sterilization of animal ligatures and of sea sponge, as follows:

Sterilization of animal ligatures, catgut, kangaroo tendon, etc.—Use large, long test tubes, say 10 inches by 1 inch, with pure rubber plugs and glass spools. Thoroughly clean and boil spools, tubes, and plugs. Wind catgut ligature on glass spools, make the kangaroo tendon into oval coils and place them in the tubes according to size and kind. Immerse in ether fortior, U. S. P., forty-eight hours, and then wash in ether. Immerse in alcohol with $\frac{1}{1000}$ bichloride of mercury (C. P.); boil twenty minutes in a water or sand bath with the plugs out; remove the tubes while boiling and plug immediately (so as to form a vacuum and remove air from ligatures), and then set aside twenty-four hours. Renew alcohol with $\frac{1}{1000}$ bichloride, and add 1 per cent of tricresol and store away ready for use. (If there be no sediment this renewal of alcohol will be superfluous.) The ligature should be kept at least three days, but it may remain any length of time in this solution before use.

On using, flame the tube, draw out the spools or coils with sterile forceps and place them in a sterile (boiled) ligature dish, with the fluid from the tube, or in common alcohol with $\frac{1}{1000}$ bichloride.

Ten years' experience shows that this method increases the tensile strength of the ligature and renders it absolutely sterile.

Sterilization of sea sponge.—Ordinary commercial formalin affords a convenient means for the complete sterilization of sea sponge. After the sponges have been freed from foreign matter, washed and dried in the usual way, they are to be placed in a wide-mouthed glass jar with a well ground glass stopper and a small quantity of the formalin solution poured over them sufficient to moisten them thoroughly. A portion of the fluid settles in a layer at the bottom while the formaldehyde gas and watery vapor fills the upper part of the jar and penetrates every fiber of the sponge. There they may be kept in store for months or even years without injury. After two or three days they are ready for use. When wanted the sponge is removed from the jar with forceps to avoid injury of the hand, and well rinsed in warm, not hot, sterile water to remove all the formalin which is injurious to the tissues. They should then be placed in warm normal salt solution for use. Experiments begun in



STERILIZATION OF ANIMAL LIGATURES.

1892 with dirty sponges from the deadhouse and kitchen at the Barnes Hospita Washington, D. C., proved the effectiveness of this method. The usual laboratory tests showed even with these sponges, no living organism after forty-eight hours in formalin solution of 40 per cent formaldehyde. Six years' constant use of sponges prepared in this way has given perfect results without a single case of infection from that source.

GUNSHOT INJURIES.

On December 31, 1899, as stated in my last annual report, there remained under treatment 216 cases of gunshot injury, but at the date of that report, October 17, 1900, only 15 of these continued on the sick reports. None of these cases terminated fatally; 3 were returned to duty, one of which was a fracture of the middle third of the femur, and 12 were discharged from the service on account of disability, as shown in the following tabulations:

Gunshot-wound cases remaining in hospital at date of last annual report, showing dispositions.

REGULARS AND VOLUNTEERS.

Character and location of wound.	Remaining at last report.	Disposition in 1900.	
		Duty.	Certificates of disability.
Head, fracture	1		1
Thorax:			
Nonpenetrating	2	1	1
Penetrating	1		1
Abdomen, penetrating	1		1
Thigh:			
Flesh	4	1	3
Fracture middle third	1	1	
Fracture lower third	1		1
Foot, flesh	3		3
Tarsus and metatarsus fracture	1		1
Total	15	3	12

REGULARS.

Character and location of wound.	Remaining at last report.	Duty.	Certificates of disability.
Thorax:			
Nonpenetrating	1	1	
Penetrating	1		1
Thigh:			
Flesh	3	1	2
Fracture lower third	1		1
Foot, flesh	2		2
Tarsus and metatarsus fracture	1		1
Total	9	2	7

VOLUNTEERS.

Character and location of wound.	Remaining at last report.	Duty.	Certificates of disability.
Head, fracture	1		1
Thorax, nonpenetrating	1		1
Abdomen, penetrating	1		1
Thigh:			
Flesh	1		1
Fracture middle third	1	1	
Foot, flesh	1		1
Total	6	1	5

During the calendar year 1900, 377 men were killed by gunshot—305 in action and 21 by accident; 30 of the deaths were suicidal and 21 homicidal, as shown in the following tables:

Killed by gunshot.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.					Nature of missile.													
		Not in action.				In action.										Not in action.			
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Remington, dum-dum.	Krag-Jörgensen.	Krag-Jörgensen, dum-dum.	Bullets, not stated.	Shrapnel.	Slugs.	Shell.	Revolver.	Krag-Jörgensen.	Revolver.	Bullets not stated.	Shell.
Head, fracture	78	5	22	4	109	26	21	1	1	....	27	1	1	...	...	7	16	8	...
Face, fracture	2	1	....	....	[1]3	1	....	....	...	....	1	...	...	...	...	1	....	....	...
Neck	18	2	....	1	21	7	4	....	...	....	6	...	...	1	...	1	....	2	...
Thorax, penetrating	101	9	5	13	128	28	28	....	3	....	39	1	1	...	1	4	15	8	...
Abdomen, penetrating	52	3	2	....	57	19	10	....	2	1	19	...	...	1	...	2	1	2	...
Clavicle or scapula, fracture	1	....	....	....	[2]1	....	1	....	...	....	....	...	...	...	...	...	....	....	...
Arm, fracture	1	....	...	....	[3]1	....	1	....	...	....	....	...	...	...	...	...	....	....	...
Thigh, flesh	3	....	....	....	[4]3	....	3	....	...	....	....	...	...	...	...	...	....	....	...
Leg, fracture	1	....	....	....	[5]1	....	....	....	...	....	1	...	...	...	...	...	....	....	...
Unknown	48	1	1	3	53	3	....	....	...	....	45	...	...	...	...	...	....	4	1
Total	305	21	30	21	377	84	68	1	6	1	138	2	2	2	1	15	32	24	1

[1] Fracture of jaw and severing tongue from floor of mouth in one case, facial artery severed in another, hemorrhage post jugular vein in the other.
[2] Hemorrhage subclavian artery.
[3] Severing brachial artery.
[4] Femoral hemorrhage mentioned in one case.
[5] Shock.

REGULARS, 1900.

Character and location of wound.	How received.					Nature of missile.												
		Not in action.				In action.									Not in action.			
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Remington, dum-dum.	Krag-Jörgensen.	Krag-Jörgensen, dum-dum.	Bullets, not stated.	Shrapnel.	Slugs.	Shell.	Krag-Jörgensen.	Revolver.	Bullets, not stated.	Shell.
Head, fracture	38	2	17	2	59	10	6	1	....	....	19	1	1	...	3	13	5	....
Face, fracture	1	....	....	....	[1]1	....	....	....	....	....	1	...	...	...	....	....	....	....
Neck	12	1	....	1	14	4	3	....	....	....	4	...	...	1	1	....	1	....
Thorax, penetrating	43	6	3	8	60	11	12	....	3	....	15	1	1	...	2	10	5	....
Abdomen, penetrating	24	....	1	....	25	8	3	....	....	1	11	...	...	1	1	....	....	....
Clavicle or scapula, fracture	1	....	....	....	[2]1	....	1	....	....	....	....	...	...	...	....	....	....	....
Arm, fracture	1	....	....	....	[3]1	....	1	....	....	....	....	...	...	...	....	....	....	....
Leg, fracture	1	....	....	....	[4]1	....	....	....	....	....	1	...	...	...	....	....	....	....
Unknown	8	1	1	1	11	....	....	....	....	....	8	...	...	...	....	....	2	1
Total	129	10	22	12	173	33	26	1	3	1	59	2	2	2	7	23	13	1

[1] Fracture of jaw and severing tongue from floor of mouth.
[2] Hemorrhage subclavian artery.
[3] Severing brachial artery.
[4] Shock.

Killed by gunshot—Continued.

VOLUNTEERS, 1900

Character and location of wound.	How received.					Nature of missile.							
		Not in action.				In action.					Not in action.		
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Revolver.	Bullets, not stated.	Krag-Jörgensen.	Revolver.	Bullets, not stated.
Head, fracture	40	3	5	2	50	16	15	1	......	8	4	3	3
Face, fracture	[1]1	[2]1	......	......	2	1	......	......	......	......	1	....	....
Neck	6	1	......	......	7	3	1	......	......	2	......	....	1
Thorax, penetrating	58	3	2	5	68	17	16	......	1	24	2	5	3
Abdomen, penetrating	28	3	1	......	32	11	7	2	......	8	1	1	2
Thigh, flesh	[3]3	......	......	......	3	......	3	......	......	......	......	....	....
Unknown	40	......	......	2	42	3	......	......	......	37	......	....	2
Total	176	11	8	9	204	51	42	3	1	79	8	9	11

[1] Severed facial artery.
[2] Hemorrhage post jugular vein.
[3] Femoral hemorrhage mentioned in one case.

Besides the 377 killed by gunshot, 1,173 cases were received in the hospital for treatment; 782 were incurred in action, 315 not in action but in line of duty, 57 not in line of duty, while 12 were suicidal and 7 homicidal.

Ninety-two of the 1,173 cases proved fatal, 70 of which were battle wounds, 12 received in line of duty, 3 not in line of duty, 4 were suicidal, and 3 homicidal.

Of the total number struck by gunshot missiles, 469, or 30.3 per cent, died from the injuries inflicted. The killed constituted 24.3 per cent of those struck and the wounded 75.7. One man was killed for every 3.1 men wounded. This is a much heavier death record than was given by the gunshot wounds of 1898 and 1899. During those years the killed constituted 11.9 per cent of those struck, the wounded 88.1 per cent, or 1 man killed for 7.4 wounded. The nature of the missile is not stated in 33 per cent of the cases; the Mauser bullet is noted in 23 per cent, the Remington in 16 per cent, the Krag-Jörgensen in 11 per cent, and the revolver in as high as 8 per cent of the total.

The following tabulations give the statistical data of—

- All gunshot wounds:
  - Regulars and Volunteers.
  - Regulars.
  - Volunteers.
- Gunshot wounds received in action:
  - Regulars and Volunteers.
  - Regulars.
  - Volunteers.
- Gunshot wounds other than battle wounds:
  - Regulars and Volunteers.
  - Regulars.
  - Volunteers.

All gunshot wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.						Nature of missile.								
		Not in action.													
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
Head:															
Flesh	22	2	3	3	1	31	10	2	5	...	...	...	10	2	...
Fracture	15	5	....	1	1	22	5	3	3	...	...	...	5	3	...
Face:															
Flesh	13	5	....	...	...	18	2	2	1	...	...	...	7	....	...
Fracture	8	3	2	...	...	13	3	1	1	...	...	...	3	4	...
Neck	18	4	1	...	...	23	9	1	4	...	...	...	6	2	...
Spine, fracture	13	....	....	...	...	13	4	2	....	...	...	...	6	....	...
Thorax:															
Nonpenetrating	29	7	1	1	...	38	12	7	2	2	...	...	9	3	...
Penetrating	45	5	4	7	2	63	20	13	4	...	...	...	17	9	...
Abdomen:															
Nonpenetrating	9	8	....	...	...	17	4	1	2	...	...	...	7	2	...
Penetrating	27	5	2	...	1	35	9	6	3	...	...	...	14	2	...
Pelvis, fracture	4	....	....	...	...	4	1	1	....	...	...	...	1	....	...
Back and hip, flesh	39	13	2	...	...	54	16	10	7	...	...	...	13	5	1
Perineum, genital and urinary organs	2	2	1	...	...	5	1	1	2	...	...	...	....	1	...
Shoulder:															
Flesh	26	10	3	...	...	39	9	4	3	...	...	...	19	3	...
Fracture clavicle or scapula	5	....	....	...	...	5	2	1	....	...	...	...	1	....	...
Joint	5	....	1	...	1	7	....	2	1	...	...	...	3	....	...
Arm:															
Flesh	58	6	4	...	...	68	25	11	6	...	...	...	20	4	...
Fracture	19	1	....	...	...	20	7	6	3	...	...	...	2	....	...
Elbow joint	16	3	....	...	...	19	4	2	2	...	...	...	8	....	...
Forearm:															
Flesh	30	12	2	...	...	44	10	2	5	...	...	1	12	8	2
Fracture	16	5	2	...	...	23	5	5	5	...	...	...	4	2	...
Wrist joint	3	1	....	...	...	4	....	1	....	...	...	...	2	....	...
Hand, flesh	28	38	4	...	...	70	12	3	10	...	...	...	27	13	...
Carpus and metacarpus, fracture	12	15	4	...	...	31	4	4	11	...	...	...	8	3	...
Fingers, fracture	3	42	4	...	...	49	1	1	19	...	...	...	20	5	1
Hip joint	2	....	....	...	...	2	1	....	....	...	...	...	....	....	...
Thigh:															
Flesh	128	28	8	...	1	165	37	40	11	...	...	...	47	16	2
Fracture, upper third	15	1	....	...	...	16	3	4	2	...	...	...	7	....	...
Fracture, middle third	5	2	....	...	...	7	2	1	2	...	...	...	2	....	...
Fracture, lower third	12	2	....	...	...	14	6	5	....	...	...	...	2	1	...
Kneejoint	15	4	1	...	...	20	6	1	1	...	...	...	5	3	1
Leg:															
Flesh	67	26	1	...	...	94	21	16	7	...	...	...	25	20	...
Fracture	28	16	1	...	...	45	6	8	7	...	2	...	10	8	...
Ankle joint	5	2	1	...	...	8	....	2	3	...	...	...	3	....	...
Foot, flesh	19	22	3	...	...	44	5	4	15	...	...	...	17	2	1
Tarsus and metatarsus, fracture	19	13	1	...	...	33	6	4	9	...	...	...	8	4	...
Toes, fracture	1	7	1	...	...	9	....	....	5	...	...	...	2	2	...
Unknown	1	....	....	...	...	1	....	....	....	...	...	...	1	....	...
Total	782	315	57	12	7	1,173	268	177	161	2	2	1	353	127	8

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[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital June 30, 1901.
[4] Remaining in hospital April 30, 1901, and June 30, 1901.

All gunshot wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.														Disposition.									
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
....	....	....	....	...	....	....	...	...	....	2	...	...	31	30	....	1	....	.....	...	...	...	....	31
....	....	....	....	...	....	1	...	...	....	2	...	...	22	1	10	10	....	.....	...	...	...	[1]1	22
1	....	....	....	...	3	....	1	1	....	....	...	...	18	15	2	....	....	.....	...	...	1	....	18
....	....	....	....	...	....	....	...	...	....	1	...	...	13	7	3	....	1	1	...	...	...	[2]1	13
....	....	....	....	...	....	....	...	...	....	1	...	...	23	17	4	1	1	.....	...	...	...	....	23
....	....	....	....	...	....	....	...	...	....	....	1	...	13	....	4	9	....	.....	...	...	...	....	13
....	....	....	....	...	....	....	...	...	....	3	...	...	38	37	....	....	....	.....	...	...	1	....	38
....	....	....	....	...	....	....	...	...	....	....	...	...	63	28	17	16	....	1	...	...	...	[3]1	63
....	....	....	....	...	1	....	...	...	....	....	...	...	17	16	1	....	....	.....	...	...	...	....	17
....	....	....	....	...	....	....	...	...	....	....	1	...	35	5	2	28	....	.....	...	...	...	....	35
....	....	....	....	...	....	....	...	1	....	....	...	...	4	1	2	....	....	1	...	...	...	....	4
....	....	....	....	...	....	....	...	...	1	1	...	...	54	49	1	1	....	1	...	...	...	[4]2	54
....	....	....	....	...	....	....	...	...	....	....	...	...	5	5	....	....	....	.....	...	...	...	....	5
....	....	....	....	...	....	....	...	...	....	....	1	...	39	31	6	....	1	1	...	...	...	....	39
....	1	....	....	...	....	....	...	...	....	....	...	...	5	4	1	....	....	.....	...	...	...	....	5
....	....	....	....	...	....	....	...	...	....	1	...	...	7	....	6	1	....	.....	...	...	...	....	7
....	....	....	....	...	....	....	...	...	....	2	...	...	68	55	9	2	1	.....	...	...	...	[5]1	68
....	....	....	....	...	....	....	...	...	1	1	...	...	20	7	10	1	....	1	...	...	...	[1]1	20
....	....	....	....	...	....	....	...	...	1	1	...	1	19	2	15	1	....	.....	...	...	...	[2]1	19
....	....	....	....	...	1	2	...	...	....	....	1	...	44	40	3	....	....	1	...	...	...	....	44
....	....	....	....	...	....	....	...	2	....	....	...	...	23	10	13	....	....	.....	...	...	...	....	23
....	....	....	....	...	....	....	...	...	....	....	1	...	4	....	4	....	....	.....	...	...	...	....	4
....	1	....	....	1	3	....	...	...	....	....	...	...	70	67	....	1	1	.....	...	...	...	[1]1	70
....	....	....	....	...	....	....	...	...	....	....	1	...	31	15	13	....	....	.....	...	...	1	[1]2	31
....	....	1	1	...	....	....	...	...	....	....	...	...	49	36	9	....	....	1	...	2	...	1	49
....	[6]1	....	....	...	....	....	...	...	....	....	...	...	2	....	1	[6]1	....	.....	...	...	...	....	2
....	1	....	....	...	1	2	...	...	1	1	6	...	165	143	13	4	2	2	1	...	...	....	165
....	....	....	....	...	....	....	...	...	....	....	...	...	16	4	6	[7]3	1	.....	...	...	...	[3]2	16
....	....	....	....	...	....	....	...	...	....	....	...	...	7	....	3	2	....	.....	...	...	1	[1]1	7
....	....	....	....	...	....	....	...	...	....	....	...	...	14	1	10	2	....	.....	...	...	...	[1]1	14
....	....	....	....	...	....	....	...	...	....	....	3	...	20	4	9	3	1	.....	...	1	1	[3]1	20
....	....	....	....	...	....	....	...	...	....	1	4	...	94	82	7	....	2	2	...	...	...	[8]1	94
....	....	....	....	...	....	....	...	...	....	2	2	...	45	16	21	1	1	1	...	...	...	5	45
....	....	....	....	...	....	....	...	...	....	....	...	...	8	....	5	2	....	.....	...	...	...	[1]1	8
....	....	....	....	...	....	....	...	...	....	....	...	...	44	40	1	....	....	2	...	...	...	[2]1	44
....	....	....	....	...	1	....	...	...	....	1	...	...	33	15	12	1	2	2	...	...	1	....	33
....	....	....	....	...	....	....	...	...	....	....	...	...	9	8	1	....	....	.....	...	...	...	....	9
....	....	....	....	...	....	....	...	...	....	....	...	...	1	....	....	1	....	.....	...	...	...	....	1
1	4	1	1	1	10	5	1	4	4	20	21	1	1,173	791	224	92	14	17	1	3	6	25	1,173

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[5] Remaining in hospital July 31, 1901.

[6] Remington bullet and detached brass jacket.

[7] 1 death in 1901.

[8] 2 remaining in hospital May 31, 1901, and 3 June 30, 1901.

All gunshot wounds—Continued.

REGULAR ARMY, 1900.

Character and location of wounds.	How received.						Nature of missile.								
		Not in action.													
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
Head:															
Flesh	13	2	2	3	1	21	4	2	3	...	...	...	8	2	...
Fracture	9	4	...	1	1	15	2	1	3	...	...	...	5	2	...
Face:															
Flesh	3	3	...	...	...	6	...	1	...	...	...	...	2	...	...
Fracture	3	2	2	...	...	7	...	...	1	...	...	...	2	3	...
Neck	7	2	1	...	...	10	2	...	1	...	...	...	4	2	...
Spine, fracture	6	...	...	...	...	6	...	...	...	...	...	...	5	...	...
Thorax:															
Nonpenetrating	9	5	1	1	...	16	5	...	1	...	...	...	4	3	...
Penetrating	20	3	3	6	2	34	6	4	3	...	...	...	14	7	...
Abdomen:															
Nonpenetrating	2	5	...	...	...	7	...	...	1	...	...	...	4	2	...
Penetrating	14	2	2	...	1	19	4	1	1	...	...	...	10	2	...
Pelvis, fracture	1	...	...	...	...	1	...	...	...	...	...	...	1	...	...
Back and hip, flesh	15	8	2	...	...	25	4	4	5	...	...	...	7	3	...
Perineum, genital and urinary organs	...	1	...	...	...	1	...	...	1	...	...	...	...	...	...
Shoulder:															
Flesh	14	3	3	...	...	20	3	2	1	...	...	...	12	1	...
Fracture clavicle or scapula	1	...	...	...	...	1	...	...	...	...	...	...	1	...	...
Joint	5	...	...	...	1	6	...	2	1	...	...	...	2	...	...
Arm:															
Flesh	23	4	2	...	...	29	7	3	3	...	...	...	12	2	...
Fracture	6	...	...	...	...	6	3	1	...	...	...	...	1	...	...
Elbow joint	10	1	...	...	...	11	1	1	...	...	...	...	7	...	...
Forearm:															
Flesh	12	7	2	...	...	21	3	...	...	...	...	...	8	5	2
Fracture	7	1	1	...	...	9	2	2	1	...	...	...	2	1	...
Wrist joint	3	...	...	...	...	3	...	1	...	...	...	...	1	...	...
Hand, flesh	11	18	3	...	...	32	3	2	4	...	...	...	13	6	...
Carpus and metacarpus, fracture	8	8	2	...	...	18	3	2	6	...	...	...	3	3	...
Fingers, fracture	1	19	3	...	...	23	...	1	5	...	...	...	11	3	1
Hip joint	2	...	...	...	...	2	1	...	...	...	...	...	...	...	...
Thigh:															
Flesh	50	19	8	...	1	78	10	13	5	...	...	...	30	11	1
Fracture upper third	5	1	...	...	...	6	1	2	1	...	...	...	2	...	...
Fracture middle third	4	1	...	...	...	5	2	1	1	...	...	...	1	...	...
Fracture lower third	1	2	...	...	...	3	...	1	...	...	...	...	1	1	...
Kneejoint	8	2	1	...	...	11	1	1	...	...	...	...	4	2	...
Leg:															
Flesh	32	12	...	...	...	44	6	5	1	...	...	...	18	9	...
Fracture	17	9	1	...	...	27	2	2	4	...	2	...	7	6	...
Ankle joints	4	1	1	...	...	6	...	1	2	...	...	...	3	...	...
Foot, flesh	9	5	...	...	...	14	...	2	2	...	...	...	8	1	1
Tarsus and metatarsus fracture	10	8	...	...	...	18	2	1	2	...	...	...	7	4	...
Toes, fracture	...	1	1	...	...	2	...	...	...	...	...	...	1	1	...
Unknown	1	...	...	...	...	1	...	...	...	...	...	...	1	...	...
Total	346	159	41	11	7	564	77	59	59	...	2	...	222	82	5

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital June 30, 1901.
[4] Remaining in hospital April 30, 1901, and June 30, 1901.

All gunshot wounds—Continued.

REGULAR ARMY, 1900.

Nature of missile.														Disposition.									
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
....	....	....	....	....	....	....	....	....	....	2	....	....	21	20	....	1	....	....	....	....	....	....	12
....	....	....	....	....	....	....	....	....	....	2	....	....	15	....	7	7	....	....	....	....	....	[1] 1	15
....	....	....	....	....	2	....	1	....	....	....	....	....	6	5	....	....	....	....	....	....	1	....	6
....	....	....	....	....	....	....	....	....	....	1	....	....	7	4	1	....	1	....	....	....	....	[2] 1	7
....	....	....	....	....	....	....	....	....	....	1	....	....	10	7	3	....	....	....	....	....	....	....	10
....	....	....	....	....	....	....	....	....	....	....	1	....	6	....	2	4	....	....	....	....	....	....	6
....	....	....	....	....	....	....	....	....	....	3	....	....	16	15	....	....	....	....	....	....	1	....	16
....	....	....	....	....	....	....	....	....	....	....	....	....	34	15	12	6	....	....	....	....	....	[3] 1	34
....	....	....	....	....	....	....	....	....	....	....	....	....	7	7	....	....	....	....	....	....	....	....	7
....	....	....	....	....	....	....	....	....	....	....	1	....	19	3	2	14	....	....	....	....	....	....	19
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	1	1	....	....	25	22	1	....	....	....	....	....	....	[4] 2	25
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	1	....	20	16	4	....	....	....	....	....	....	....	20
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	1	....	....	6	....	5	1	....	....	....	....	....	....	6
....	....	....	....	....	....	....	....	....	....	2	....	....	29	24	4	....	....	....	....	....	....	[5] 1	29
....	....	....	....	....	....	....	....	....	....	1	....	....	6	2	3	....	....	....	....	....	....	[1] 1	6
....	....	....	....	....	....	....	....	....	....	1	....	1	11	....	10	....	....	....	....	....	....	[2] 1	11
....	....	....	....	....	1	1	....	....	....	....	1	....	21	18	3	....	....	....	....	....	....	....	21
....	....	....	....	....	....	....	....	1	....	....	....	....	9	4	5	....	....	....	....	....	....	....	9
....	....	....	....	....	....	....	....	....	....	....	1	....	3	....	3	....	....	....	....	....	....	....	3
....	....	....	....	1	3	....	....	....	....	....	....	....	32	31	....	....	....	....	....	....	....	[1] 1	32
....	....	....	....	....	....	....	....	....	....	....	1	....	18	7	9	....	....	....	....	....	....	[1] 2	18
....	....	1	1	....	....	....	....	....	....	....	....	....	23	17	4	....	....	....	....	1	....	[1] 1	23
....	[6] 1	....	....	....	....	....	....	....	....	....	....	....	2	....	1	[6] 1	....	....	....	....	....	....	2
....	....	....	....	....	1	....	....	....	....	1	6	....	78	68	9	1	....	....	....	....	....	....	78
....	....	....	....	....	....	....	....	....	....	....	....	....	6	2	1	[7] 1	....	....	....	....	....	[3] 2	6
....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	2	2	....	....	....	....	....	[1] 1	5
....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	1	1	....	....	....	....	....	[1] 1	3
....	....	....	....	....	....	....	....	....	....	....	3	....	11	1	6	2	....	....	....	1	....	[3] 1	11
....	....	....	....	....	....	....	....	....	....	1	4	....	44	41	2	....	....	....	....	....	....	[1] 1	44
....	....	....	....	....	....	....	....	....	....	2	2	....	27	10	12	....	....	....	....	....	....	[8] 5	27
....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	4	1	....	....	....	....	....	[1] 1	6
....	....	....	....	....	....	....	....	....	....	....	....	....	14	11	....	....	....	2	....	....	....	[2] 1	14
....	....	....	....	....	1	....	....	....	....	1	....	....	18	10	7	1	....	....	....	....	....	....	18
....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	1
....	1	1	1	1	8	1	1	1	1	20	21	1	564	363	125	44	1	2	....	2	2	25	564

---

[5] Remaining in hospital July 31, 1901.

[6] Remington bullet and detached brass jacket.

[7] Died in 1901,

[8] 2 remaining in hospital May 31, 1901, and 3 remaining June 30, 1901.

All gunshot wounds—Continued.

VOLUNTEER ARMY, 1900.

Character and location of wounds.	How received.						Nature of missile.								
		Not in action.													
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
Head:															
Flesh	9	....	1	...	...	10	6	....	2	...	...	...	2	....	...
Fracture	6	1	....	...	...	7	3	2	....	...	...	...	....	1	...
Face:															
Flesh	10	2	....	...	...	12	2	1	1	...	...	...	5	....	...
Fracture	5	1	....	...	...	6	3	1	....	...	...	...	1	1	...
Neck	11	2	....	...	...	13	7	1	3	...	...	...	2	....	...
Spine, fracture	7	....	....	...	...	7	4	2	....	...	...	...	1	....	...
Thorax:															
Nonpenetrating	20	2	....	...	...	22	7	7	1	2	...	...	5	....	...
Penetrating	25	2	1	1	...	29	14	9	1	...	...	...	3	2	...
Abdomen:															
Nonpenetrating	7	3	....	...	...	10	4	1	1	...	...	...	3	....	...
Penetrating	13	3	....	...	...	16	5	5	2	...	...	...	4	....	...
Pelvis, fracture	3	....	....	...	...	3	1	1	....	...	...	...	....	....	...
Back and hip, flesh	24	5	....	...	...	29	12	6	2	...	...	...	6	2	1
Perineum, genital and urinary organs	2	1	1	...	...	4	1	1	1	...	...	...	....	1	...
Shoulder:															
Flesh	12	7	....	...	...	19	6	2	2	...	...	...	7	2	...
Fracture clavicle or scapula	4	....	....	...	...	4	2	1	....	...	...	...	....	....	...
Joint	....	....	1	...	...	1	....	....	....	...	...	...	1	....	...
Arm:															
Flesh	35	2	2	...	...	39	18	8	3	...	...	...	8	2	...
Fracture	13	1	....	...	...	14	4	5	3	...	...	...	1	....	...
Elbow joint	6	2	....	...	...	8	3	1	2	...	...	...	1	....	...
Forearm:															
Flesh	18	5	....	...	...	23	7	2	5	...	...	1	4	3	...
Fracture	9	4	1	...	...	14	3	3	4	...	...	...	2	1	...
Wrist joint	....	1	....	...	...	1	....	....	....	...	...	...	1	....	...
Hand, flesh	17	20	1	...	...	38	9	1	6	...	...	...	14	7	...
Carpus and metacarpus, fracture	4	7	2	...	...	13	1	2	5	...	...	...	5	....	...
Fingers, fracture	2	23	1	...	...	26	1	....	14	...	...	...	9	2	...
Thigh:															
Flesh	78	9	....	...	...	87	27	27	6	...	...	...	17	5	1
Fracture upper third	10	....	....	...	...	10	2	2	1	...	...	...	5	....	...
Fracture middle third	1	1	....	...	...	2	....	....	1	...	...	...	1	....	...
Fracture lower third	11	....	....	...	...	11	6	4	....	...	...	...	1	....	...
Kneejoint	7	2	....	...	...	9	5	....	1	...	...	...	1	1	1
Leg:															
Flesh	35	14	1	...	...	50	15	11	6	...	...	...	7	11	...
Fracture	11	7	....	...	...	18	4	6	3	...	...	...	3	2	...
Ankle joint	1	1	....	...	...	2	....	1	1	...	...	...	....	....	...
Foot, flesh	10	17	3	...	...	30	5	2	13	...	...	...	9	1	...
Tarsus and metatarsus, fracture	9	5	1	...	...	15	4	3	7	...	...	...	1	....	...
Toes, fracture	1	6	....	...	...	7	....	....	5	...	...	...	1	1	...
Total	436	156	16	1	...	609	191	118	102	2	...	1	131	45	3

All gunshot wounds—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.														Disposition.									
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
													10	10									10
						1							7	1	3	3							7
1					1			1					12	10	2								12
													6	3	2			1					6
													13	10	1	1	1						13
													7		2	5							7
													22	22									22
													29	13	5	10		1					29
					1								10	9	1								10
													16	2		14							16
								1					3	1	1			1					3
													29	27		1		1					29
													4	4									4
	1												19	15	2		1	1					19
													4	3	1								4
													1		1								1
													39	31	5	2	1						39
									1				14	5	7	1		1					14
									1				8	2	5	1							8
						1							23	22				1					23
								1					14	6	8								14
													1		1								1
	1												38	36		1	1						38
													13	8	4						1		13
													26	19	5			1		1			26
	1					2			1				87	75	4	3	2	2	1				87
													10	2	5	2	1						10
													2		1						1		2
													11	1	9	1							11
													9	3	3	1	1				1		9
													50	41	5		2	2					50
													18	6	9	1	1	1					18
													2		1	1							2
													30	29	1								30
													15	5	5		2	2			1		15
													7	7									7
1	3				2	4		3	3				609	428	99	48	13	15	1	1	4		609

Gunshot wounds received in action.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel propelled by striking bullets.
Head:										
Flesh	10	2	2				6			
Fracture	5	3	1				3			
Face:										
Flesh	2	2					6			1
Fracture	3	1					3			
Neck	9	1	1				6			
Spine, fracture	4	2					6			
Thorax:										
Nonpenetrating	12	7		2			5	1		
Penetrating	20	13	1				11			
Abdomen:										
Nonpenetrating	4	1					4			
Penetrating	9	6					11			
Pelvis, fracture	1	1					1			
Back and hip, flesh	16	10	2				8		1	
Perineum, genital and urinary organs.	1	1								
Shoulder:										
Flesh	9	4					12			
Fracture clavicle or scapula	2	1					1			
Joint		2					2			
Arm:										
Flesh	25	11	2				18			
Fracture	7	6	2				2			
Elbow joint	4	2					7			
Forearm:										
Flesh	10	2	4			1	10			
Fracture	5	5					4			
Wrist joint		1					1			
Hand, flesh	11	3					12			
Carpus and metacarpus, fracture	4	4	1				2			
Fingers, fracture	1	1					1			
Hip joint	1									
Thigh:										
Flesh	37	40	3				35	1	1	
Fracture upper third	3	4	1				7			
Fracture middle third	2	1					2			
Fracture lower third	6	5					1			
Knee joint	6	1					4		1	
Leg:										
Flesh	21	16	3				22			
Fracture	6	8			2		8			
Ankle joint		2					3			
Foot, flesh	5	3	1				10			
Tarsus and metatarsus, fracture	6	4	1				7			
Toes, fracture			1							
Unknown							1			
Total	267	176	26	2	2	1	242	2	3	1

---

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital April 30, 1901, and June 30, 1901.
[4] Remaining in hospital July 31, 1901.

Gunshot wounds received in action.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
......	......	......	....	....	....	2	....	....	22	21	......	1	....	......	....	......	......	22
......	......	1	....	....	....	2	....	....	15	1	7	6	....	......	....	......	[1] 1	15
......	......	......	1	1	....	....	....	....	13	11	1	....	....	......	....	1	......	13
......	......	......	....	....	....	1	....	....	8	3	3	....	....	1	....	......	[2] 1	8
......	......	......	....	....	....	1	....	....	18	12	4	1	1	......	....	......	......	18
......	......	......	....	....	....	....	1	....	13	......	4	9	....	......	....	......	......	13
......	......	......	....	....	....	2	....	....	29	29	......	....	....	......	....	......	......	29
......	......	......	....	....	....	....	....	....	45	20	14	10	....	1	....	......	......	45
......	......	......	....	....	....	....	....	....	9	8	1	....	....	......	....	......	......	9
......	......	......	....	....	....	....	1	....	27	3	2	22	....	......	....	......	......	27
......	......	......	....	1	....	....	....	....	4	1	2	....	....	1	....	......	......	4
......	......	......	....	....	1	1	....	....	39	35	1	1	....	......	....	......	[3] 2	39
......	......	......	....	....	....	....	....	....	2	2	......	....	....	......	....	......	......	2
......	......	......	....	....	....	....	1	....	26	20	5	....	....	1	....	......	......	26
1	......	......	....	....	....	....	....	....	5	4	1	....	....	......	....	......	......	5
......	......	......	....	....	....	1	....	....	5	......	4	1	....	......	....	......	......	5
......	......	......	....	....	....	2	....	....	58	45	9	2	1	......	....	......	[4] 1	58
......	......	......	....	....	1	1	....	....	19	6	10	1	....	1	....	......	[1] 1	19
......	......	......	....	....	1	1	....	1	16	1	14	1	....	......	....	......	......	16
......	......	2	....	....	....	....	1	....	30	27	2	....	....	1	....	......	......	30
......	......	......	....	2	....	....	....	....	16	6	10	....	....	......	....	......	......	16
......	......	......	....	....	....	....	1	....	3	......	3	....	....	......	....	......	......	3
1	1	......	....	....	....	....	....	....	28	27	......	....	1	......	....	......	......	28
......	......	......	....	....	....	....	1	....	12	5	6	....	....	......	....	......	[1] 1	12
......	......	......	....	....	....	....	....	....	3	1	1	....	....	......	....	......	[1] 1	3
[5] 1	......	......	....	....	....	....	....	....	2	......	1	[5] 1	....	......	....	......	......	2
1	......	2	....	....	1	1	6	....	128	107	13	3	2	2	1	......	......	128
......	......	......	....	....	....	....	....	....	15	3	6	[6] 3	1	......	....	......	[7] 2	15
......	......	......	....	....	....	....	....	....	5	......	2	1	....	......	....	1	[1] 1	5
......	......	......	....	....	....	....	....	....	12	1	10	1	....	......	....	......	......	12
......	......	......	....	....	....	....	3	....	15	4	6	3	1	......	....	......	[7] 1	15
......	......	......	....	....	....	1	4	....	67	59	6	....	1	1	....	......	......	67
......	......	......	....	....	....	2	2	....	28	5	18	....	1	1	....	......	[8] 3	28
......	......	......	....	....	....	....	....	....	5	......	4	1	....	......	....	......	......	5
......	......	......	....	....	....	....	....	....	19	16	1	....	....	2	....	......	......	19
......	......	......	....	....	....	1	....	....	19	8	5	1	2	2	....	1	......	19
......	......	......	....	....	....	....	....	....	1	1	......	....	....	......	....	......	......	1
......	......	......	....	....	....	....	....	....	1	......	......	1	....	......	....	......	......	1
4	1	5	1	4	4	19	21	1	782	492	176	70	11	14	1	3	15	782

[5] Remington bullet and detached brass jacket.
[6] One death in 1901.
[7] Remaining in hospital June 30, 1901.
[8] One remaining in hospital May 31, 1901, and two remaining June 30, 1901.

Gunshot wounds received in action—Continued.

REGULAR ARMY, 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel propelled by striking bullets.
Head:										
Flesh	4	2	1	......	......	.....	4	......	......	......
Fracture	2	1	1	......	......	......	3	......	......	......
Face:										
Flesh	......	1	......	......	......	......	1	......	......	......
Fracture	......	......	......	......	......	......	2	......	......	......
Neck	2	......	......	......	......	......	4	......	......	......
Spine, fracture	......	......	......	......	......	......	5	......	......	......
Thorax:										
Nonpenetrating	5	......	......	......	......	......	1	1	......	......
Penetrating	6	4	......	......	......	......	10	......	......	......
Abdomen:										
Nonpenetrating	......	......	......	......	......	......	2	......	......	......
Penetrating	4	1	......	......	......	......	8	......	......	......
Pelvis, fracture	......	......	......	......	......	......	1	......	......	......
Back and hip, flesh	4	4	1	......	......	......	4	......	......	......
Shoulder:										
Flesh	3	2	......	......	......	......	8	......	......	......
Fracture clavicle or scapula	......	......	......	......	......	......	1	......	......	......
Joint	......	2	......	......	......	......	2	......	......	......
Arm:										
Flesh	7	3	......	......	......	......	11	......	......	......
Fracture	3	1	......	......	......	......	1	......	......	......
Elbow joint	1	1	......	......	......	......	6	......	......	......
Forearm:										
Flesh	3	......	......	......	......	......	7	......	......	......
Fracture	2	2	......	......	......	......	2	......	......	......
Wrist joint	......	1	......	......	......	......	1	......	......	......
Hand, flesh	3	2	......	......	......	......	5	......	......	......
Carpus and metacarpus, fracture	3	2	......	......	......	......	2	......	......	......
Fingers, fracture	......	1	......	......	......	......	......	......	......	......
Hip joint	1	......	......	......	......	......	......	......	......	......
Thigh:										
Flesh	10	13	1	......	......	......	19	......	......	......
Fracture upper third	1	2	......	......	......	......	2	......	......	......
Fracture middle third	2	1	......	......	......	......	1	......	......	......
Fracture lower third	......	1	......	......	......	......	......	......	......	......
Knee joint	1	1	......	......	......	......	3	......	......	......
Leg:										
Flesh	6	5	......	......	......	......	16	......	......	......
Fracture	2	2	......	......	2	......	7	......	......	......
Ankle joint	......	1	......	......	......	......	3	......	......	......
Foot, flesh	......	2	......	......	......	......	7	......	......	......
Tarsus and metatarsus, fracture	2	1	......	......	......	......	6	......	......	......
Unknown	......	......	......	......	......	......	1	......	......	......
Total	77	59	4	......	2	......	156	1	......	......

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[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital April 30, 1901, and June 30, 1901.
[4] Remaining in hospital July 31, 1901.

Ganshot wounds received in action—Continued.

REGULAR ARMY, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
						2			13	12		1						13
						2			9		4	4					[1] 1	9
			1						3	2						1		3
						1			3	1	1						[2] 1	3
						1			7	4	3							7
							1		6		2	4						6
						2			9	9								9
									20	9	9	2						20
									2	2								2
							1		14	1	2	11						14
									1		1							1
					1	1			15	12	1						[3] 2	15
							1		14	10	4							14
									1	1								1
						1			5		4	1						5
						2			23	18	4						1	23
						1			6	2	3						1	6
						1		1	10		10							10
		1					1		12	10	2							12
				1					7	3	4							7
							1		3		3							3
	1								11	11								11
							1		8	2	5						[1] 1	8
									1								[1] 1	1
[5] 1									2		1	[6] 1						2
						1	6		50	41	9							50
									5	1	1	[6] 1					[7] 2	5
									4		2	1					[1] 1	4
									1		1							1
							3		8	1	4	2					[7] 1	8
						1	4		32	30	2							32
						2	2		17	4	10						[8] 3	17
									4		4							4
									9	7				2				9
						1			10	6	3	1						10
									1			1						1
1	1	1	1	1	1	19	21	1	346	199	99	30	....	2	....	1	15	346

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[5] Remington bullet and detached brass jacket.
[6] Died in 1901.
[7] Remaining in hospital June 30, 1901.
[8] One remaining in hospital May 31, 1901, and two remaining June 30, 1901.

Gunshot wounds received in action—Continued.

VOLUNTEER ARMY 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel propelled by striking bullets.
Head:										
Flesh	6	......	1	......	......	......	2	......	......	......
Fracture	3	2	......	......	......	......	......	......	......	......
Face:										
Flesh	2	1	......	......	......	......	5	......	......	1
Fracture	3	1	......	......	......	......	1	......	......	......
Neck	7	1	1	......	......	......	2	......	......	......
Spine, fracture	4	2	......	......	......	......	1	......	......	......
Thorax:										
Nonpenetrating	7	7	......	2	......	......	4	......	......	......
Penetrating	14	9	1	......	......	......	1	......	......	......
Abdomen:										
Nonpenetrating	4	1	......	......	......	......	2	......	......	......
Penetrating	5	5	......	......	......	......	3	......	......	......
Pelvis, fracture	1	1	......	......	......	......	......	......	......	......
Back and hip, flesh	12	6	1	......	......	......	4	......	1	......
Perineum, genital and urinary organs	1	1	......	......	......	......	......	......	......	......
Shoulder:										
Flesh	6	2	......	......	......	......	4	......	......	......
Fracture clavicle or scapula	2	1	......	......	......	......	......	......	......	......
Arm:										
Flesh	18	8	2	......	......	......	7	......	......	......
Fracture	4	5	2	......	......	......	1	......	......	......
Elbow joint	3	1	......	......	......	......	1	......	......	......
Forearm:										
Flesh	7	2	4	......	......	1	3	......	......	......
Fracture	3	3	......	......	......	......	2	......	......	......
Hand, flesh	8	1	......	......	......	......	7	......	......	......
Carpus and metacarpus, fracture	1	2	1	......	......	......	......	......	......	......
Fingers, fracture	1	......	......	......	......	......	1	......	......	......
Thigh:										
Flesh	27	27	2	......	......	......	16	1	1	......
Fracture upper third	2	2	1	......	......	......	5	......	......	......
Fracture middle third	......	......	......	......	......	......	1	......	......	......
Fracture lower third	6	4	......	......	......	......	1	......	......	......
Knee joint	5	......	......	......	......	......	1	......	1	......
Leg:										
Flesh	15	11	3	......	......	......	6	......	......	......
Fracture	4	6	......	......	......	......	1	......	......	......
Ankle joint	......	1	......	......	......	......	......	......	......	......
Foot, flesh	5	1	1	......	......	......	3	......	......	......
Tarsus and metatarsus, fracture	4	3	1	......	......	......	1	......	......	......
Toes, fracture	......	......	1	......	......	......	......	......	......	......
Total	190	117	22	2	......	1	86	1	3	1

Gunshot wounds received in action—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
......	......	......	....	....	....	....	....	....	9	9	......	....	....	......	....	......	......	9
......	......	1	....	....	....	....	....	....	6	1	3	2	....	......	....	......	......	6
......	......	......	....	1	....	....	....	....	10	9	1	....	....	......	....	......	......	10
......	......	......	....	....	....	....	....	....	5	2	2	....	....	1	....	......	......	5
......	......	......	....	....	....	....	....	....	11	8	1	1	1	......	....	......	......	11
......	......	......	....	....	....	....	....	....	7	......	2	5	....	......	....	......	......	7
......	......	......	....	....	....	....	....	....	20	20	......	....	....	......	....	......	......	20
......	......	......	....	....	....	....	....	....	25	11	5	8	....	1	....	......	......	25
......	......	......	....	....	....	....	....	....	7	6	1	....	....	......	....	......	......	7
......	......	......	....	....	....	....	....	....	13	2	......	11	....	......	....	......	......	13
......	......	......	....	1	....	....	....	....	3	1	1	....	....	1	....	......	......	3
......	......	......	....	....	....	....	....	....	24	23	......	1	....	......	....	......	......	24
......	......	......	....	....	....	....	....	....	2	2	......	....	....	......	....	......	......	2
......	......	......	....	....	....	....	....	....	12	10	1	....	....	1	....	......	......	12
1	......	......	....	....	....	....	....	....	4	3	1	....	....	......	....	......	......	4
......	......	......	....	....	....	....	....	....	35	27	5	2	1	......	....	......	......	35
......	......	......	....	....	1	....	....	....	13	4	7	1	....	1	....	......	......	13
......	......	......	....	....	1	....	....	....	6	1	4	1	....	......	....	......	......	6
......	......	1	....	....	....	....	....	....	18	17	......	....	....	1	....	......	......	18
......	......	......	....	1	....	....	....	....	9	3	6	....	....	......	....	......	......	9
1	......	......	....	....	....	....	....	....	17	16	......	....	1	......	....	......	......	17
......	......	......	....	....	....	....	....	....	4	3	1	....	....	......	....	......	......	4
......	......	......	....	....	....	....	....	....	2	1	1	....	....	......	....	......	......	2
1	......	2	....	....	1	....	....	....	78	66	4	3	2	2	1	......	......	78
......	......	......	....	....	....	....	....	....	10	2	5	2	1	......	....	......	......	10
......	......	......	....	....	....	....	....	....	1	......	......	....	....	......	....	1	......	1
......	......	......	....	....	....	....	....	....	11	1	9	1	....	......	....	......	......	11
......	......	......	....	....	....	....	....	....	7	3	2	1	1	......	....	......	......	7
......	......	......	....	....	....	....	....	....	35	29	4	....	1	1	....	......	......	35
......	......	......	....	....	....	....	....	....	11	1	8	....	1	1	....	......	......	11
......	......	......	....	....	....	....	....	....	1	......	......	1	....	......	....	......	......	1
......	......	......	....	....	....	....	....	....	10	9	1	....	....	......	....	......	......	10
......	......	......	....	....	....	....	....	....	9	2	2	....	2	2	....	1	......	9
......	......	......	....	....	....	....	....	....	1	1	......	....	....	......	....	......	......	1
3	......	4	....	3	3	....	....	....	436	293	77	40	11	12	1	2	......	436

Gunshot wounds other than battle wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh	2	3	3	1	9	......	......	3	4	2
Fracture	5	......	1	1	7	......	......	2	2	3
Face:										
Flesh	5	......	......	......	5	......	......	1	1	......
Fracture	3	2	......	......	5	......	......	1	......	4
Neck	4	1	......	......	5	......	......	3	......	2
Thorax:										
Nonpenetrating	7	1	1	......	9	......	......	2	4	2
Penetrating	5	4	7	2	18	......	......	3	6	9
Abdomen:										
Nonpenetrating	8	......	......	......	8	......	......	2	3	2
Penetrating	5	2	......	1	8	......	......	3	3	2
Back and hip, flesh	13	2	......	......	15	......	......	5	5	5
Perineum, genital and urinary organs.	2	1	......	......	3	......	......	2	......	1
Shoulder:										
Flesh	10	3	......	......	13	......	......	3	7	3
Joint	......	1	......	1	2	......	......	1	1	......
Arm:										
Flesh	6	4	......	......	10	......	......	4	2	4
Fracture	1	......	......	......	1	......	......	1	......	......
Elbow joint	3	......	......	......	3	......	......	2	1	......
Forearm:										
Flesh	12	2	......	......	14	......	......	1	2	8
Fracture	5	2	......	......	7	......	......	5	......	2
Wrist joint	1	......	......	......	1	......	......	......	1	......
Hand, flesh	38	4	......	......	42	1	......	10	15	13
Carpus and metacarpus, fracture	15	4	......	......	19	......	......	10	6	3
Fingers, fracture	42	4	......	......	46	......	......	19	19	5
Thigh:										
Flesh	28	8	......	1	37	......	......	8	12	15
Fracture, upper third	1	......	......	......	1	......	......	1	......	......
Fracture, middle third	2	......	......	......	2	......	......	2	......	......
Fracture, lower third	2	......	......	......	2	......	......	......	1	1
Knee joint	4	1	......	......	5	......	......	1	1	3
Leg:										
Flesh	26	1	......	......	27	......	......	4	3	20
Fracture	16	1	......	......	17	......	......	7	2	8
Ankle joint	2	1	......	......	3	......	......	3	......	......
Foot, flesh	22	3	......	......	25	......	1	14	7	2
Tarsus and metatarsus, fracture	13	1	......	......	14	......	......	8	1	4
Toes, fracture	7	1	......	......	8	......	......	4	2	2
Total	315	57	12	7	391	1	1	135	111	125

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[1] Remaining in hospital June 30, 1901.
[2] Remaining in hospital Apr. 30, 1901.

Gunshot wounds other than battle wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
					9	9								9
					7		3	4						7
			3		5	4	1							5
					5	4			1					5
					5	5								5
				1	9	8						1		9
					18	8	3	6					[1]1	18
			1		8	8								8
					8	2		6						8
					15	14				1				15
					3	3								3
					13	11	1		1					13
					2		2							2
					10	10								10
					1	1								1
					3	1	1						[2]1	3
2			1		14	13	1							14
					7	4	3							7
					1		1							1
			3		42	40		1					[3]1	42
					19	10	7					1	[3]1	19
1	1	1			46	35	8			1	2			46
1			1		37	36		1						37
					1	1								1
					2		1	1						2
					2			1					[3]1	2
					5		3				1	1		5
					27	23	1		1	1			[3]1	27
					17	11	3	1					[4]2	17
					3		1	1					[3]1	3
1					25	24							[2]1	25
			1		14	7	7							14
					8	7	1							8
5	1	1	10	1	391	299	48	22	3	3	3	3	10	391

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[3] Remaining in hospital May 31, 1901.
[4] Remaining in hospital May 31, 1901, and June 30, 1901.

Gunshot wounds other than battle wounds—Continued.

REGULAR ARMY, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh	2	2	3	1	8	......	......	2	4	2
Fracture	4	......	1	1	6	......	......	2	2	2
Face:										
Flesh	3	......	......	......	3	......	......	......	1	......
Fracture	2	2	......	......	4	......	......	1	......	3
Neck	2	1	......	......	3	......	......	1	......	2
Thorax:										
Nonpenetrating	5	1	1	......	7	......	......	1	3	2
Penetrating	3	3	6	2	14	......	......	3	4	7
Abdomen:										
Nonpenetrating	5	......	......	......	5	......	......	1	2	2
Penetrating	2	2	......	1	5	......	......	1	2	2
Back and hip, flesh	8	2	......	......	10	......	......	4	3	3
Perineum, genital and urinary organs	1	......	......	......	1	......	......	1	......	......
Shoulder:										
Flesh	3	3	......	......	6	......	......	1	4	1
Joint	......	......	......	1	1	......	......	1	......	......
Arm, flesh	4	2	......	......	6	......	......	3	1	2
Elbow joint	1	......	......	......	1	......	......	......	1	......
Forearm:										
Flesh	7	2	......	......	9	......	......	......	1	5
Fracture	1	1	......	......	2	......	......	1	......	1
Hand, flesh	18	3	......	......	21	......	......	4	8	6
Carpus and metacarpus, fracture	8	2	......	......	10	......	......	6	1	3
Fingers, fracture	19	3	......	......	22	......	......	5	11	3
Thigh:										
Flesh	19	8	......	1	28	......	......	4	11	11
Fracture, upper third	1	......	......	......	1	......	......	1	......	......
Fracture, middle third	1	......	......	......	1	......	......	1	......	......
Fracture, lower third	2	......	......	......	2	......	......	......	1	1
Knee joint	2	1	......	......	3	......	......	......	1	2
Leg:										
Flesh	12	......	......	......	12	......	......	1	2	9
Fracture	9	1	......	......	10	......	......	4	......	6
Ankle joint	1	1	......	......	2	......	......	2	......	......
Foot, flesh	5	......	......	......	5	......	......	2	1	1
Tarsus and metatarsus, fracture	8	......	......	......	8	......	......	2	1	4
Toes, fracture	1	1	......	......	2	......	......	......	1	1
Total	159	41	11	7	218	......	......	55	66	81

[1] Remaining in hospital June 30, 1901.
[2] Remaining in hospital Apr. 30, 1901.

Gunshot wounds other than battle wounds—Continued.

REGULAR ARMY, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
					8	8								8
					6		3	3						6
			2		3	3								3
					4	3			1					4
					3	3								3
				1	7	6						1		7
					14	6	3	4					[1]1	14
					5	5								5
					5	2		3						5
					10	10								10
					1	1								1
					6	6								6
					1		1							1
					6	6								6
					1								[2]1	1
2			1		9	8	1							9
					2	1	1							2
			3		21	20							[3]1	21
					10	5	4						[3]1	10
1	1	1			22	17	4				1			22
1			1		28	27		1						28
					1	1								1
					1			1						1
					2			1					[3]1	2
					3		2				1			3
					12	11							[3]1	12
					10	6	2						[4]2	10
					2			1					[3]1	2
1					5	4							[2]1	5
			1		8	4	4							8
					2	1	1							2
5	1	1	8	1	218	164	26	14	1	......	2	1	10	218

[3] Remaining in hospital May 31, 1901.
[4] Remaining in hospital May 31, 1901, and June 30, 1901.

Gunshot wounds other than battle wounds—Continued.

VOLUNTEER ARMY, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh	......	1	......	......	1	......	......	1	......	......
Fracture	1	......	......	......	1	......	......	......	......	1
Face:										
Flesh	2	......	......	......	2	......	......	1	......	......
Fracture	1	......	......	......	1	......	......	......	......	1
Neck	2	......	......	......	2	......	......	2	......	......
Thorax:										
Nonpenetrating	2	......	......	......	2	......	......	1	1	......
Penetrating	2	1	1	......	4	......	......	......	2	2
Abdomen:										
Nonpenetrating	3	......	......	......	3	......	......	1	1	......
Penetrating	3	......	......	......	3	......	...	2	1	......
Back and hip, flesh	5	......	......	......	5	......	...	1	2	2
Perineum, genital and urinary organs.	1	1	......	......	2	......	......	1	......	1
Shoulder:										
Flesh	7	......	......	......	7	......	......	2	3	2
Joint	......	1	......	......	1	......	......	......	1	......
Arm:										
Flesh	2	2	......	......	4	......	......	1	1	2
Fracture	1	......	......	......	1	......	......	1	......	......
Elbow joint	2	......	......	......	2	......	......	2	......	......
Forearm:										
Flesh	5	......	......	......	5	......	......	1	1	3
Fracture	4	1	......	......	5	......	......	4	......	1
Wrist joint	1	......	......	......	1	......	......	......	1	......
Hand, flesh	20	1	......	......	21	1	......	6	7	7
Carpus and metacarpus, fracture	7	2	......	......	9	......	......	4	5	......
Fingers, fracture	23	1	......	......	24	......	......	14	8	2
Thigh:										
Flesh	9	......	......	......	9	......	......	4	1	4
Fracture, middle third	1	......	......	......	1	......	......	1	......	......
Knee joint	2	......	......	......	2	......	......	1	......	1
Leg:										
Flesh	14	1	......	......	15	......	......	3	1	11
Fracture	7	......	......	......	7	......	......	3	2	2
Ankle joint	1	......	......	......	1	......	......	1	......	......
Foot, flesh	17	3	......	......	20	......	1	12	6	1
Tarsus and metatarsus, fracture	5	1	......	......	6	......	......	6	......	......
Toes, fracture	6	......	......	......	6	......	......	4	1	1
Total	156	16	1	......	173	1	1	80	45	44

Gunshot wounds other than battle wounds—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
......	......	......	......	......	1	1	......	......	......	......	......	......	......	1
......	......	......	......	......	1	......	......	1	......	......	......	......	......	1
......	......	......	1	......	2	1	1	......	......	......	......	......	......	2
......	......	......	......	......	1	1	......	......	......	......	......	......	......	1
......	......	......	......	......	2	2	......	......	......	......	......	......	......	2
......	......	......	......	......	2	2	......	......	......	......	......	......	......	2
......	......	......	......	......	4	2	......	2	......	......	......	......	......	4
......	......	......	1	......	3	3	......	......	......	......	......	......	......	3
......	......	......	......	......	3	......	......	3	......	......	......	......	......	3
......	......	......	......	......	5	4	......	......	......	1	......	......	......	5
......	......	......	......	......	2	2	......	......	......	......	......	......	......	2
......	......	......	......	......	7	5	1	......	1	......	......	......	......	7
......	......	......	......	......	1	......	1	......	......	......	......	......	......	1
......	......	......	......	......	4	4	......	......	......	......	......	......	......	4
......	......	......	......	......	1	1	......	......	......	......	......	......	......	1
......	......	......	......	......	2	1	1	......	......	......	......	......	......	2
......	......	......	......	......	5	5	......	......	......	......	......	......	......	5
......	......	......	......	......	5	3	2	......	......	......	......	......	......	5
......	......	......	......	......	1	......	1	......	......	......	......	......	......	1
......	......	......	......	......	21	20	......	1	......	......	......	......	......	21
......	......	......	......	......	9	5	3	......	......	......	......	1	......	9
......	......	......	......	......	24	18	4	......	......	1	1	......	......	24
......	......	......	......	......	9	9	......	......	......	......	......	......	......	9
......	......	......	......	......	1	......	1	......	......	......	......	......	......	1
......	......	......	......	......	2	......	1	......	......	......	......	1	......	2
......	......	......	......	......	15	12	1	......	1	1	......	......	......	15
......	......	......	......	......	7	5	1	1	......	......	......	......	......	7
......	......	......	......	......	1	......	1	......	......	......	......	......	......	1
......	......	......	......	......	20	20	......	......	......	......	......	......	......	20
......	......	......	......	......	6	3	3	......	......	......	......	......	......	6
......	......	......	......	......	6	6	......	......	......	......	......	......	......	6
......	......	......	2	......	173	135	22	8	2	3	1	2	......	173

Of the 92 cases which terminated fatally, 28 deaths occurred among 35 penetrating wounds of the abdomen, a mortality of 80 per cent, as compared with 70 per cent in the years 1898 and 1899. Laparotomy was performed in 4 of the 28 cases, and an abrasion of the ileum was sutured in 1 of the 7 cases which recovered. Of these cases, 5 were returned to duty and 2 discharged on certificates of disability.

Sixteen of the 92 deaths occurred among 63 penetrating wounds of the thorax, a mortality of 25.4 per cent, as compared with 27.8 during 1898 and 1899.

Fractures of the femur had a mortality of 19 per cent caused by 7 deaths among 37 patients, as against 11 per cent in 1898 and 1899. During the past year, however, the total number of cases was smaller and the relative number of upper third fractures larger than in the years cited. Fractures of the knee joint had a mortality of 15 per cent.

The mortality in fractures of the spine constituted 69.2 per cent of the cases, 13, of which 9 were fatal, and fractures of the skull were 45.5 per cent fatal—10 deaths in 22 cases.

The following tables show the statistical details in these fatal cases:

Gunshot wounds which terminated fatally.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet.	Shell.	Shrapnel.	Krag-Jörgensen.	Bullet, not stated.	Revolver.
Head:															
Flesh	1	....	....	....	....	[1] 1	....	....	1	....	....	....	....	....	....
Fracture	6	2	....	1	1	[2] 10	....	3	2	....	1	....	....	1	3
Neck	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Spine, fracture	9	....	....	....	....	[3] 9	3	1	4	....	....	1	....	....	....
Thorax, penetrating	10	1	2	3	....	[4] 16	5	3	2	....	....	....	....	5	1
Abdomen, penetrating	22	5	....	....	1	[5] 28	7	6	8	....	....	1	3	2	1
Back and hip, flesh	1	....	....	....	....	[6] 1	1	....	....	....	....	....	....	....	....
Shoulder joint	1	....	....	....	....	[7] 1	....	....	....	....	1	....	....	....	....
Arm:															
Flesh	2	....	....	....	....	[8] 2	....	2	....	....	....	....	....	....	....
Fracture	1	....	....	....	....	[9] 1	....	1	....	....	....	....	....	....	....
Elbow joint	1	....	....	....	....	[10] 1	....	1	....	....	....	....	....	....	....
Hand, flesh	....	1	....	....	....	[11] 1	....	....	....	....	....	....	1	....	....
Hip joint	1	....	....	....	....	[12] 1	....	....	....	1	....	....	....	....	....

[1] Skull trephined for traumatic acute diffuse meningitis; died of traumatic acute diffuse meningitis.

[2] Removal of fragments of bone in two cases. Death after skull trephining in two cases.

[3] Tetanus in one case.

[4] Septicæmia in one case. In another, pneumonia in right lung and gangrene in left. Cartilage and bone removed.

[5] Septic infection in one case. Laparotomy in four cases.

[6] Septicæmia.

[7] Amputation at shoulder joint.

[8] Brachial artery severed in one case. In the other amputation at shoulder, with death from gangrene

[9] Died of shock following amputation at shoulder joint.

[10] Amputation 3 inches above elbow joint.

[11] Tetanus.

[12] Remington bullet with detached brass jacket removed; fragments bone removed; died of septic infection.

Gunshot wounds which terminated fatally—Continued.

REGULAR AND VOLUNTEER ARMIES, 1900—Continued.

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet.	Shell.	Shrapnel.	Krag-Jörgensen.	Bullet, not stated.	Revolver.
Thigh: Flesh	3	....	....	....	1	[1]4	1	1	1	....	....	....	....	....	1
Fracture, upper third	3	....	....	....	....	[2]3	....	....	3	....	....	....	....	....	....
Fracture, middle third	1	1	....	....	....	[3]2	....	1	....	....	....	....	1	....	....
Fracture, lower third	1	1	....	....	....	[4]2	....	1	....	....	....	....	....	1	....
Knee joint	3	....	....	....	....	[5]3	1	1	....	....	....	1	....	....	....
Leg, fracture	....	1	....	....	....	[6]1	....	....	....	....	....	....	1	....	....
Ankle joint	1	....	1	....	....	[7]2	....	1	....	....	....	....	1	....	....
Tarsus and metatarsus, fracture	1	....	....	....	....	[8]1	....	....	1	....	....	....	....	....	....
Unknown	1	....	....	....	....	[9]1	....	....	1	....	....	....	....	....	....
Total	70	12	3	4	3	92	18	23	23	1	2	3	7	9	6
REGULAR ARMY, 1900.															
Head: Flesh	[10]1	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Fractures	[11]4	1	....	1	[12]1	7	....	1	2	....	1	....	....	1	2
Spine, fracture	4	....	....	....	....	4	....	....	3	....	....	1	....	....	....
Thorax, penetrating	2	....	[8]1	3	....	6	....	1	1	....	....	....	....	3	1
Abdomen, penetrating	[13]11	2	....	....	1	14	4	1	5	....	....	1	1	1	1
Shoulder joint	[14]1	....	....	....	....	1	....	....	....	....	1	....	....	....	....
Hip joint	[15]1	....	....	....	....	1	....	....	....	1	....	....	....	....	....
Thigh: Flesh	....	....	....	....	[16]1	1	....	....	....	....	....	....	....	....	1
Fracture, upper third	[17]1	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Fracture, middle third	[18]1	[19]1	....	....	....	2	....	1	....	....	....	....	1	....	....
Fracture, lower third	....	[20]1	....	....	....	1	....	....	....	....	....	....	....	1	....
Knee joint	[21]2	....	....	....	....	2	....	1	....	....	....	1	....	....	....
Ankle joint	....	....	[22]1	....	....	1	....	....	....	....	....	....	1	....	....
Tarsus and metatarsus, fracture	[22]1	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Unknown	[9]1	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Total	30	5	2	4	3	44	4	5	15	1	2	3	3	6	5

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[1] Tetanus in one case. Septicæmia in another. Traumatic femoral aneurism and gangrene of foot in another. No remarks in the fourth.

[2] One died in 1901 after operation by naval surgeon. In another, fragments bone removed; septic infection. In the other, fragments bone removed with later excision of head of femur; died of septicæmia and shock.

[3] In one case fragments bone removed and marrow cavity curetted; septicæmia. In the other, amputation upper third thigh; died of shock.

[4] In one case exhaustion following primary shock. In the other, amputation lower third thigh; died of shock.

[5] In one case pyæmia. In another, death from septic arthritis knee after removal of piece of shell from knee. The other was wounded May 11; fragments bone removed May 11; amputation upper third thigh July 20; died August 11, sepsis and exhaustion.

[6] Amputation above knee; died of shock following operation.

[7] Amputation of leg in one case; died of septicæmia. In the other, amputation lower third thigh for gangrene; collapse during operation.

[8] Septicæmia.

[9] Died while a prisoner in hands of insurgents.

[10] Skull trephined for traumatic acute diffuse meningitis; died of traumatic acute diffuse meningitis.

[11] One died after operation for removal of fragments of bone and one died after trephining of skull.

[12] Death after trephining skull.

[13] Laparotomy in two cases, in one of which there was excision of 4 inches of ragged gut; ends joined by Murphy's button. In the other, perforation of $\frac{1}{8}$-inch in ileum was sewed up with Lembert suture.

[14] Amputation at shoulder joint.

[15] Remington bullet with detached brass jacket removed; fragments bone removed; died of septic infection.

[16] Tetanus.

[17] Died in 1901 after operation by naval surgeon.

[18] Fragments bone removed and marrow cavity curetted; died of septicæmia.

[19] Amputation, upper third thigh; died of shock.

[20] Amputation, lower third thigh; died of shock.

[21] In one there was removal of piece of shell from knee; died of septic arthritis of knee. The other was wounded May 11; fragments bone removed May 11; amputation upper third thigh, July 20. Died August 19 of sepsis and exhaustion.

[22] Amputation of leg; died of septicæmia.

Gunshot wounds which terminated fatally—Continued.

VOLUNTEER ARMY 1900.

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet.	Shell.	Shrapnel.	Krag-Jörgensen.	Bullet, not stated.	Revolver.
Head, fracture	[1]2	1	....	....	....	3	....	2	....	....	....	....	....	....	1
Neck	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Spine, fracture	[2]5	....	....	....	....	5	3	1	1	....	....	....	....	....	....
Thorax, penetrating	[3]8	1	1	....	....	10	5	2	1	....	....	....	....	2	....
Abdomen, penetrating	[4]11	3	....	....	....	14	3	5	3	....	....	....	2	1	....
Back and hip, flesh	[5]1	....	....	....	....	1	1	....	....	....	....	....	....	....	....
Arm:															
Flesh	[6]2	....	....	....	....	2	....	2	....	....	....	....	....	....	....
Fracture	[7]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Elbow joint	[8]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Hand, flesh	....	[9]1	....	....	....	1	....	....	....	....	....	....	1	....	....
Thigh:															
Flesh	[10]3	....	....	....	....	3	1	1	1	....	....	....	....	....	....
Fracture, upper third	[11]2	....	....	....	....	2	....	....	2	....	....	....	....	....	....
Fracture, lower third	[12]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Knee joint	[13]1	....	....	....	....	1	1	....	....	....	....	....	....	....	....
Leg, fracture	....	[14]1	....	....	....	1	....	....	....	....	....	....	1	....	....
Ankle joint	[15]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Total	40	7	1	....	....	48	14	18	8	....	....	....	4	3	1

[1] Small spiculæ of bone removed in one case.

[2] Tetanus in one case.

[3] Pneumonia in right lung, and gangrene in left lung in one case. Cartilage and bone removed.

[4] Septic infection in one case. Laparotomy in two cases, in one of which Murphy's button was used.

[5] Septicæmia.

[6] Brachial artery severed in one case. Amputation at shoulder in the other, with death from gangrene.

[7] Died of shock following amputation of shoulder joint.

[8] Amputation 3 inches above elbow joint.

[9] Tetanus.

[10] Septicæmia in one case. In another case, traumatic femoral aneurism and gangrene of foot. No remarks on third case.

[11] Fragments bone removed; septic infection in one case. In the other, fragments bone removed with later excision of head of femur; died of septicæmia and shock.

[12] Exhaustion following primary shock.

[13] Pyæmia.

[14] Amputation above knee; died of shock following operation.

[15] Amputation of lower third thigh for gangrene; collapse during operation.

Surgical work was reported in connection with 208 of these gunshot wounds; 171 of the patients recovered, 27 died, and 10 remained under treatment at latest reports. The discovery and removal of the missile was due to the use of the X-ray in 4 cases. Cartilage and bone were removed in 1 case of penetrating wound of the thorax which proved fatal, and in another, which was successful, a portion of the seventh rib was removed. Five laparotomies were performed, only 1 of which had a favorable termination. A fracture of the pelvis was reported in which two and a half months after the injury the wound was enlarged and a piece of drainage tube 5 inches long was removed. Amputation at the shoulder joint was performed in 4 cases, with only 1 recovery. The arm was amputated in 6 cases, 1 of which proved fatal; the forearm in 3 cases and parts of the hand in 50 cases, in 1 of which death occurred from chloroform narcosis. Amputation was performed at the hip joint in 1 case and disarticulation in 2 cases—all successful, while 1 case of excision of the head of the femur was fatal from septicæmia. Five cases of amputation of the thigh were fatal, 7 recovered, while 1 remains under treatment. Four of these amputations of the thigh were for fractures of the leg, 1 for a flesh wound of the leg infected by the bacillus aerogenes capsulatus, 3 for fractures of the knee joint, 4 for fractures of the femur, and 1 for a flesh wound of the thigh in which the femoral artery was severed. Three of the deaths were from shock, 1 from sepsis, and 1 from chronic dysentery. One knee-joint amputation was successful. Seven amputations of the leg ended in recovery and 1 in death from septicæmia in a fracture of the ankle. Besides several resections and excisions the femoral artery was ligated in 3 cases, the brachial in 2 cases, and the posterior tibial in 1 case.

The details of this surgical work are given in the following table:

Surgical operations for gunshot wounds.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Head:				
Flesh	Skull trephined for traumatic acute diffuse meningitis.	......	[1]1	......
Fracture	Bullet located by X-ray and removed	1		
Do	Fragments of bone removed	2	2	......
Do	Craniotomy for necrosis of skull	1	......	......
Do	Trephining	1	2	......
Face:				
Flesh	Enucleation of eye	1	......	......
Fracture	Bullet removed	1	......	......
Do	Bullet located by X-ray and removed	1	......	......
Do	Excision of sup. maxilla	1	......	......
Do	Fragments of bone removed	1	......	......
Do	Necrosed bone removed	1	......	......
Spine, fracture	Pieces of jacket of cartridge removed	1	......	......
Thorax, penetrating	Bullet removed	1	......	1
Do	Cartilage and bone removed	......	1	......
Do	Blood removed by aspiration	1	......	......
Do	Large quantities of blood and bloody fluid removed by aspiration September 28, October 10, and October 14; resection of 1½ inches of right seventh rib October 17; large drainage tube inserted.	1	......	......
Abdomen, penetrating	Laparotomy	......	4	......
Do	Celiotomy; abrasions in ileum sutured	1	......	......
Do	Bone curetted on 4 different occasions (wounded in 1899 in iliac region, penetrating abdomen).	1	......	......
Pelvis, fracture	Carious bone curetted (wounded in 1899)	1	......	......
Do	Sequestra removed from lower border right pelvic bone and fistulous tract cauterized.	1	......	......
Do	Wound enlarged and denuded bone curetted	1	......	......
Do	Wound enlarged 2½ months after date of wound and drainage tube 5 inches long found therein.	1	......	......
Perineum, genital, and urinary organs.	Bullet extracted (wounded in 1899)	1	......	......
Do	Testicle removed	1	......	......
Shoulder:				
Flesh	Bullet located by X-ray and removed	1	......	......
Fracture clavicle or scapula.	Fragments of bone removed	1	......	......
Do	Fragments of bone and part of brass shell covering of bullet removed.	1	......	......
Shoulder joint	Amputation at shoulder joint	......	1	......
Do	Fragments of scapula and bullet removed	1	......	......
Arm, flesh	Amputation at shoulder joint for gangrene	......	[3]1	......
Do	Ligation of brachial artery	2	......	......
Do	1¼ inches of musculo-spiral nerve removed; ends brought together with fine silk sutures.	1	......	......
Arm, fracture	Incision for liberation of musculo-spiral nerve from compression on fractured ends of bone.	1	......	......
Do	Removal of fragments of bone	1	......	1
Do	Removal of pieces of jacket of bullet pressing on nerve.	1	......	......
Do	Removal of fragments of shell and bone	1	......	......
Do	Amputation at shoulder for gangrene	1	......	......
Do	Amputation at shoulder joint	......	[4]1	......
Do	Amputation arm through upper third	1	......	......
Do	Operation for necrosis of humerus	1	......	......
Elbow joint	Bullet removed	1	......	......
Do	Fragments of bone removed	1	......	1
Do	Fragments of bone removed July 3; arm amputated July 6 for infection.	1	......	......
Do	Amputation of arm upper third July 13; flaps opened and drained July 17 for suppuration.	1	......	......
Do	Amputation 3 inches above elbow joint	......	1	......
Do	Resection elbow joint	2	......	......
Do	Ankylosis fingers, wrist, and elbow broken up; fibrous union of humerus refractured.	1	......	......
Forearm, fracture	Fragments of bone removed	7	......	......

[1] Died of traumatic acute diffuse meningitis.

[2] Death from gangrene.

Surgical operations for gunshot wounds.

REGULARS AND VOLUNTEERS, 1900.

Nature of missile.													
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One-pounder.	Iron slug from cannon.	Explosion of cartridge.
......	......	......	......	1	......	......	......	......	......	......	......	......	......
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......	1	4	......	1	1	......	......	......	......	......	......	......	......

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[3] Died of shock following operation.

[4] Bullet 2¼ inches long, made of scrap iron.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Forearm, fracture	Fragments of bone removed and ends of ulna and radius spliced and wired February 27; amputation April 17 above elbow for necrosis.	1		
Do	Fragments of bone removed and later resection of broken ends of radius and ulna.	1		
Do	Slugs removed on admission in January and 5 inches of radius removed in June.	1		
Do	Amputation of forearm	2		
Do	Amputation above elbow May 1. Reamputation at junction of middle and upper thirds of humerus May 7. On account of supposed hæmophilia, tourniquet was left on arm, resulting in gangrene, and natural amputation at level of axilla. Remaining necrosed shaft of humerus and head removed July 5.	1		
Do	Resection of radius	1		
Wrist joint	Amputation forearm; reamputation elbow joint	1		
Hand, flesh	Amputation fingers	2		
Carpus and metacarpus, fracture.	Amputation fingers and metacarpal bones	3		
Do	Amputation fingers	4	[1] 1	1
Do	Amputation arm	1		
Do	Dead bone removed	1		
Do	Necrosed bone curetted	1		
Do	Portion of fourth metacarpal bone removed. Adhesions of joints second and third fingers broken up.	1		
Do	Amputation finger September 24, 1900[2]			1
Do	Extensor tendon of third finger severed: 6 inches of exposed tendons of flexor sublimus digitorum, and flexors middle and index fingers excised.[2]	1		
Fingers, fracture	Amputation fingers	39		
Do	Projecting pieces of bone trimmed off	1		
Hip joint	Removal of fragments of bone, bullet, and detached brass jacket.		[3] 1	
Thigh, flesh	Ligation of femoral artery	2		
Do	Amputation at junction of middle and lower third thigh, bullet having severed femoral artery.	1		
Thigh, fracture upper third	Dead bone removed			1
Do	Ends of femur brought together and wired April 12. Disarticulation at hip May 28	1		
Do	Fragments of bone and piece of bullet removed	1		
Do	Piece of bone removed	1		
Do	Removal of fragments of gunstock, lead, bullet jacket and bone December 18, 1900.[4]	1		
Do	Removal of fragments of bone		[5] 1	
Do	Removal of fragments of bone April 12; head of femur excised April 21.		[6] 1	
Thigh, fracture middle third	Bullet removed			1
Do	Fragments of bone removed	1		
Do	Fragments of bone removed and marrow cavity curetted.		[7] 1	
Do	Amputation at hip joint (wounded in 1899)	1		
Do	Amputation upper third thigh		[8] 1	
Do	Amputation for gangrene	1		
Thigh, fracture lower third	Carious bone removed	2		
Do	Fragments of bone removed	2		
Do	Fragments of bone removed in March and May; necrosed bone curetted October 26; amputation upper third thigh November 24.	1		
Do	Bullet and fragments of bone removed March 27; wounds incised and pus removed May 26.	1		
Do	Amputation lower third thigh		[8] 1	
Do	Removal of 1⅛ inches of lower fragment of femur	1		
Knee joint	Bullet removed	2		
Do	Fragments of bone and dead tissue removed	1		
Do	Fragments of bone, bullet, and shell removed	1		

[1] Died of chloroform narcosis.
[2] Wrist amputation in 1901.
[3] Septic infection.
[4] Disarticulation of femur, for sepsis, 1901.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Nature of missile.													
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One-pounder.	Iron slug from cannon.	Explosion of cartridge.
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......	......	16	......	18	3	......	......	......	1	1	......	......	......
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1	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	1	......	......	......	......	......	......	......	......	......
......	......	......	......	......	1	......	......	......	......	......	......	......	......
......	......	......	......	......	2	......	......	......	......	......	......	......	......
......	......	......	......	1	......	......	......	......	......	......	......	......	......
1	......	......	......	......	......	......	......	......	......	......	......	......	......

[5] Died of septic infection.
[6] Died of septicæmia and shock.
[7] Died of septicæmia.
[8] Died of shock following operation.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Knee joint	Piece of shell removed	......	[1] 1	......
Do	Fragments of bone removed May 11; amputation upper third thigh July 20.	......	[2] 1	......
Do	Amputation through knee joint	1	......	......
Do	Amputation middle third thigh	1	[3] 1	......
Leg, flesh	Amputation middle third thigh for bacillus capsulatus.	1	......	......
Do	Bullet located by X-ray and removed	1	......	......
Do	Femoral artery ligated for popliteal aneurism	1	......	......
Leg, fracture	Bullet removed	1	......	......
Do	Fragments of bone removed	5	......	......
Do	Fragments of bone removed and marrow cavity curetted.	......	......	1
Do	Removal of bone and several pieces of metal	1	......	......
Do	Fragments of bone removed April 22; carious bone removed May 28.	......	......	1
Do	Amputation below knee	3	......	......
Do	Amputation lower third thigh for osteitis	......	......	1
Do	Amputation above knee	......	[4] 1	......
Do	Amputation leg July 2; amputation middle third thigh Nov. 3.	1	......	......
Do	Amputation thigh, junction lower and middle thirds, December 18, 1900. 1 inch more removed February 8, 1901.	1	......	......
Do	Ends of fragments of bone freshened and a portion removed from upper fragment and placed in apposition.	1	......	......
Do	Resection of fibula	1	......	......
Ankle joint	Amputation of leg	......	[5] 1	......
Do	Amputation lower third thigh for gangrene	......	[6] 1	......
Tarsus and metatarsus, fracture.	Bullet removed	1	......	......
Do	Fragments of bone removed	2	......	......
Do	Fragments of bone and eyelet of shoe removed	1	......	......
Do	Amputation of leg for gangrene	1	......	......
Do	Amputation of toe	1	......	......
Do	Secondary amputation junction lower and middle third leg.	1	......	......
Do	Fragments of bone removed April 12; remainder third metatarsal bone removed April 21; amputation of leg April 23 to save life.	1	......	......
Do	Ligation of posterior tibial artery for secondary hemorrhage.	1	......	......
Toes, fracture	Amputation toes	7	......	......
Do	Dead bone removed	1	......	......
Do	Shattered phalanx curetted and spiculæ removed	1	......	......
Total		171	27	10

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[1] Died of septic arthritis, knee.
[2] Died of sepsis and exhaustion.
[3] Died of chronic dysentery.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Nature of missile.													
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One-pounder.	Iron slug from cannon.	Explosion of cartridge.
								1					
	1												
	1			1				1					
		1											
1													
1													
					1								
1	1	1		2									
							1						
			1										
		1											
1		1					1						
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1		1											
			1										
	1												
	1												
		1											
				1									
		1											
		5		1	1								
				1									
					1								
34	40	48	2	49	18	2	7	3	1	1	1	1	

[4] Died of shock following operation.
[5] Died of septicæmia.
[6] Collapse during operation.

Besides the gunshot wounds received in action, the battle casualties of the year included 41 men killed and 83 men wounded, mostly by the bolo, kris, or spear. Five of the 83 wounded died of their wounds.

Killed in action, caused by wounds other than gunshot.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wounds.	Regulars.	Volunteers.					Total regulars and volunteers.
	Bolo.	Bolo.	Dagger.	Spear.	Kris.	Total.	
Head, fracture	3	7	....	....	....	7	10
Neck	....	3	....	....	1	4	4
Thorax, penetrating	....	7	1	1	....	9	9
Abdomen, penetrating	....	4	....	1	....	5	5
Shoulder	....	1	....	....	....	1	1
Unknown	2	10	....	....	....	10	12
Total	5	32	1	2	1	36	41

Wounds other than gunshot received in action.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wounds.	Weapon.									Total.	Disposition.					
	Bolo.	Dagger.	Spear.	Bamboo spear.	Lance.	Arrow.	Heated arrow.	Club.	Rock.		Duty.	Certificates of disability.	Died.	Order.	Muster out.	Remaining last report.
Head:																
Flesh	3	....	....	....	....	....	....	1	1	5	5	....	....	....	....	....
Fracture	5	....	....	....	....	....	....	....	....	5	1	1	1	[1]1	....	[2]1
Neck	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Thorax:																
Nonpenetrating	3	....	....	....	....	....	1	....	....	4	4	....	....	....	....	....
Penetrating	2	....	....	1	....	....	....	....	....	3	1	....	1	....	1	....
Abdomen:																
Nonpenetrating	1	....	....	1	....	....	....	....	....	2	2	....	....	....	....	....
Penetrating	1	1	....	....	....	....	....	....	....	2	....	....	2	....	....	....
Back and hip, flesh	6	....	....	1	....	....	....	....	....	7	6	....	....	1	....	....
Shoulder:																
Flesh	4	....	....	....	....	....	....	....	....	4	4	....	....	....	....	....
Joint	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Arm:																
Flesh	3	2	....	1	....	....	....	....	....	6	3	[3]3	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	[4]1	....	....	....	....
Forearm:																
Flesh	5	1	....	3	....	....	....	....	....	9	9	....	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Hand, flesh	8	....	1	2	....	....	....	....	....	11	11	....	....	....	....	....
Carpus and metacarpus, fracture	2	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....
Fingers, fracture	3	....	....	....	....	....	....	....	....	3	[5]2	....	....	....	....	[6]1
Thigh, flesh	2	....	1	6	....	....	....	....	....	9	8	....	....	....	1	....
Knee joint	....	....	....	....	1	....	....	....	....	1	....	1	....	....	....	....
Leg, flesh	2	....	....	1	....	2	....	....	....	5	5	....	....	....	....	....
Tarsus and metatarsus, fracture	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Total	55	4	2	16	1	2	1	1	1	83	63	9	5	2	2	2

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[1] Pieces of bone removed.

[2] Skull trephined. Remaining in hospital May 31, 1901.

[3] In one case, bulbous swelling on musculo-spiral nerve excised and nerve sutured. In another case, injured portion musculo-spiral nerve resected, ends sutured, and ends of severed biceps muscle fastened and sutured. In another case, amputation at shoulder joint for gangrene, brachial artery having been severed.

[4] Arm amputated.

[5] In one case, finger amputated.

[6] Remaining in hospital March 31, 1901.

Wounds other than gunshot received in action—Continued.

REGULARS, 1900.

Character and location of wounds.	Weapon.										Disposition.					
	Bolo.	Dagger.	Spear.	Bamboo spear.	Lance.	Arrow.	Heated arrow.	Club.	Rock.	Total.	Duty.	Certificates of disability.	Died.	Order.	Muster out.	Remaining last report.
Head:																
Flesh	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	[1]1
Thorax:																
Nonpenetrating	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	....	....	....	1	....	....	....	....	....	1	....	....	1	....	....	....
Abdomen:																
Nonpenetrating	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	....	1	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Shoulder, flesh	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Arm, fracture	1	....	....	....	....	....	....	....	....	1	....	[2]1	....	....	....	....
Forearm, flesh	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Fingers, fracture	2	....	....	....	....	....	....	....	....	2	[3]1	....	....	....	....	[4]1
Thigh, flesh	1	....	....	2	....	....	....	....	....	3	3	....	....	....	....	....
Knee joint	....	....	....	....	1	....	....	....	....	1	....	1	....	....	....	....
Leg, flesh	1	....	....	....	....	1	....	....	....	2	2	....	....	....	....	....
Tarsus and metatarsus, fracture	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Total	11	1	....	3	1	1	....	....	1	18	12	2	2	....	....	2

VOLUNTEERS, 1900.

Character and location of wounds.	Bolo.	Dagger.	Spear.	Bamboo spear.	Lance.	Arrow.	Heated arrow.	Club.	Rock.	Total.	Duty.	Certificates of disability.	Died.	Order.	Muster out.	Remaining last report.
Head:																
Flesh	3	....	....	....	....	....	....	1	....	4	4	....	....	....	....	....
Fracture	4	....	....	....	....	....	....	....	....	4	1	1	1	[5]1	....	....
Neck	1		....	....	....	....	....	....	....	1	....	....	1	....	....	....
Thorax:																
Nonpenetrating	2	....	....	....	....	....	1	....	....	3	3	....	....	....	....	....
Penetrating	2	....	....	....	....	....	....	....	....	2	1	....	....	....	1	....
Abdomen:																
Nonpenetrating	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Back and hip, flesh	6	....	....	1	....	....	....	....	....	7	6	....	....	1	....	....
Shoulder:																
Flesh	3	....	....	....	....	....	....	....	....	3	3	....	....	....	....	....
Joint	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Arm, flesh	3	2	....	1	....	....	....	....	....	6	3	[6]3	....	....	....	....
Forearm:																
Flesh	4	1	....	3	....	....	....	....	....	8	8	....	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Hand, flesh	8	....	1	2	....	....	....	....	....	11	11	....	....	....	....	....
Carpus and metacarpus, fracture	2	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....
Fingers, fracture	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Thigh, flesh	1	....	1	4	....	....	....	....	....	6	5	....	....	....	1	....
Leg, flesh	1	....	....	1	....	1	....	....	....	3	3	....	....	....	....	....
Total	44	3	2	13	....	1	1	1	....	65	51	7	3	2	2	....

[1] Skull trephined. Remaining in hospital May 31, 1901.

[2] Arm amputated.

[3] Finger amputated.

[4] Remaining in hospital March 31, 1901.

[5] Pieces of bone removed.

[6] In one case, bulbous swelling on musculo-spiral nerve excised and nerve sutured. In another case, injured portion musculo-spiral nerve resected, ends sutured and ends of severed biceps muscle fastened and sutured. In another case, amputation at shoulder joint for gangrene, brachial artery having been severed.

Special surgical reports, rendered to June 30, 1901.

Name.	Rank.	Reports.
Baird, W. T	Contract surgeon	Adenitis, incision.
Banister, J. M	Major and surgeon	Report on the radical cure of varicocele.[1] Operations for the radical cure of hernia, 5 cases.
Block, W. H	Contract surgeon	Operations for the radical cure of hernia.
Borden, W. C	Major and surgeon	Operations for the radical cure of hernia, 41 cases. Report on the radical cure of varicocele.[1] Operations for the radical cure of hernia, enlisted men of the United States Navy. Popliteal aneurism.
Bradley, A. E	Captain and assistant surgeon.	Operations for the radical cure of hernia, 4 cases. Varicocele. Appendicitis. Tubercular testicle. Report on the radical cure of varicocele.[1]
Calhoun, Wm. H	Contract surgeon	Gunshot wound of chest, suicide.
Carling, John	First lieutenant and assistant surgeon.	Gunshot wound of head.
Carr, L. C	Major and surgeon volunteers.	Operation for the radical cure of hernia, 2 cases.
Corbusier, W. H	Major and surgeon	Appendicitis.
Darnall, C. R	First lieutenant and assistant surgeon.	Amœbic abscess of liver, 4 cases.[2] Gangrenous inflammation of Meckel's diverticulum.[2] Report of surgical operations hospital ship Relief.
DeMey, C. F	Contract surgeon	Incised wound of the neck, severe.
Fauntleroy, P. C	First lieutenant and assistant surgeon.	Operation for the radical cure of hernia. Abscess of liver.
Flagg, Charles E. B	Captain and assistant surgeon.	Amputation of the umbilical cord at the skin margin. Histories of cases operated on since June, 1900. Description of operation for hemorrhoids. Operation for varicocele, 3 cases. Report of surgical operations during year ending June 30, 1901.
Frick, E. B	do	Operation for the radical cure of hernia.
Girard, A. C	Lieutenant-colonel and deputy surgeon-general.	Report of surgical operations for period ending Apr. 30, 1900. Report of surgical operations, 27 cases. Report of surgical operations, September to December, 1900. Report on the radical cure of varicocele.[3] Report of surgical operations, Nov. 30, 1900, to Feb. 28, 1901. Operation for the radical cure of hernia. Report of surgical operations during March, April, and May, 1901.
Hallock, H. M	Captain and assistant surgeon.	Removal of abdominal tumor, fibro-sarcoma.
Howard, D. C	do	Septic arthritis, multiple incision and tube drainage. Operation for the radical cure of hernia, 2 cases. Rupture of spleen.[4] Operation for varicocele, 5 cases. Traumatic neuritis, neurectomy, and nerve suture.
Keefer, F. R	do	Drowning.
Kendall, W. P	Major and surgeon	Septicæmia.
Kennedy, J. S	Contract surgeon	Fracture of skull. Operation for the radical cure of hernia. Gunshot wound of chest.
Kilbourne, H. S	Major and surgeon	Laryngeal stenosis.
Leepere, Matthew	Contract surgeon	Prostatitis, cystitis, and urethral fistula.
Lyster, Theo. C	First lieutenant and assistant surgeon.	Lumbar abscess.
Metcalf, B. H	Contract surgeon	Abscess of lung.
Neff, Wallace	Major and surgeon volunteers.	Femoral aneurism.
Perley, H. O	Major and surgeon	Report of surgical operations on hospital ship Relief, Jan. 1 to May 31, 1900.
Phillips, John L	do	Intestinal obstruction, laparotomy.
Ramsey, George D	Contract surgeon	Gangrenous appendicitis.
Rhoads, T. L	do	Appendicitis.
Shimer, Ira A	First lieutenant and assistant surgeon.	Operation for the radical cure of hernia.
Stark, A. N	Captain and assistant surgeon.	Traumatic rupture, middle meningeal artery. Compound depressed fracture of skull. Strangulated femoral hernia. Operation for radical cure of hernia.
Stone, J. Hamilton	First lieutenant and assistant surgeon.	Perineal urethrotomy. Operation for the radical cure of hernia, 4 cases. Fistula in ano. Enucleation of eye.
Whittington, W. L	Contract surgeon	Gunshot wound of thigh, amputation.
Woodruff, C. E	Major and surgeon	Operation for the radical cure of hernia.

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[1] Published in Circular No. 3, Surgeon-General's Office, 1901.
[2] Published in the New York Medical Journal, February 9, 1901.
[3] Published in Circular No. 3, Surgeon-General's Office, 1901.
[4] Published in the Philadelphia Medical Journal, March 11, 1901.

A report on the use of the Röntgen ray by the Medical Department of the United States Army in the war with Spain, prepared under my direction by Capt. W. C. Borden, assistant surgeon (now major and surgeon), United States Army, was received from the Government Printing Office in January, 1901, and has since been distributed. Experience with the use of the Röntgen ray apparatus leads Major Borden to the conclusions that its use in movable hospitals is not advisable and that it should be restricted to permanent base and general hospitals. His reasons for this are: First, that lodged bullets require immediate removal only in extremely rare instances; second, that the environment of and conditions incident to movable field hospitals render asepsis in operating practically impossible, and in consequence in field hospitals noninterference with wounds should be practiced to the utmost extent possible; third, that surgical interference with lodged bullets, except where adequate asepsis is available or the necessity urgent, is to be condemned, as the suppuration which follows is much more detrimental to the patient than the presence of the lodged missile; fourth, that a Röntgen ray apparatus in the field is an additional incentive to surgeons to operate under conditions not adequately aseptic. The report shows clearly that in noninfected wounds extensive comminution of bone is not as a rule an indication for operative intervention; that where there is infection, complete cleansing of the wound and removal of all loose bone fragments, followed by drainage, antiseptic dressings and irrigation, usually suffice, and that excision or amputation is to be resorted to only in extreme cases.

ABSTRACTS FROM THE RECORDS OF THE ARMY HOSPITAL SHIP RELIEF, SUBMITTED MARCH 12, 1901.

[Operations by First Lieut. Carl R. Darnall, assistant surgeon, United States Army.]

Amputation at elbow joint for osteomyelitis of radius and ulna, following amputation of forearm.—E. J. O., private, Company A, Twenty-eighth Infantry, United States Volunteers; age, 21; native of Pennsylvania; admitted to *Relief* June 11, 1900, from regimental hospital at Taal, Luzon, P. I. History: This man was wounded in left wrist on May 30, 1900, accidentally. The damage done was so great that the regimental medical officer amputated through the lower third of the forearm. The wound became infected, and when received on the *Relief* his temperature was high, ranging from 102° to 105° F., and his condition was bad. There was acute osteomyelitis of ulna and radius in the stump. I disarticulated at the elbow joint June 12, 1900. Recovery uneventful, union being primary.

Amputation of thigh for compound gunshot fracture of tibia and fibula.—H. G. D., private, Company M, Fourteenth United States Infantry; age, 34; native of Ireland; admitted to *Relief* September 4, 1900, from United States general hospital, Tientsin, China. History: On August 15, 1900, at Pekin, was wounded in left leg. Bullet entered at internal surface at junction of upper and middle third. It passed outward and backward, fracturing and badly comminuting tibia. Fibula also was fractured. The wound was infected when he was admitted to this ship, and pus had burrowed upward and downward between the muscles. An attempt was made to save the limb by opening up all the pockets and making counter openings in several places for through and through drainage. His condition remained fairly good, but there was very free discharge of pus. On November 13, thirteen weeks after the injury, I decided to amputate, as he was gradually growing weaker, and the ship being ordered to Manila it was thought advisable to perform the operation before returning to the Tropics. I made a long anterior and short posterior flap, dividing the femur above the condyles, as without this flaps of sufficient length could not be obtained. The wound healed by primary union, recovery being rapid and uneventful.

Amputation of thigh for tuberculosis of knee.—L. H. S., private, G, Sixth United States Artillery; age, 24; native of Indiana; admitted to *Relief* December 28, 1900, from post hospital at Cebu, P. I. History: On September 25 had an attack of acute pleurisy, right side. About October 18 an arthritis of left knee developed. The joint became greatly swollen and tender and opened spontaneously about November 3. All the tissues became greatly thickened. The joint was completely disorganized, and the patient became much emaciated. He had hectic fever and night sweats. The limb both above and below the joint became riddled with sinuses. When admitted to the *Relief* his condition was extremely bad. He was a mere skeleton and had high fever every evening. A diagnosis of tubercular disease had been made. His lungs and other organs seemed unaffected, and on January 3, 1901, I amputated, dividing the bone at junction of upper and middle thirds of thigh. Shock was quite severe, but that having been overcome he had no further trouble. The wound healed by primary union, and on the twentieth day after operation his general condition was so much improved that he was able to be about on crutches. He rapidly regained his strength, and recovery is apparently complete.

Periostitis of femur.—G. B., private, Company C, First United States Infantry; age, 19; native of Pennsylvania; admitted to *Relief* December 7, 1900, from military hospital, Catbalogan, Samar, P. I. Diagnosis on transfer slip: Acute arthritis left knee. History: While on an expedition about October 15, 1900, he first noticed pain and stiffness on inner side of middle of left thigh. This extended downward to just above knee. This pain gradually increased and was worse at night. On admission to *Relief* he had a temperature of 98.8° in evening. There was pain and stiffness of knee and deep fusiform swelling involving middle third of thigh. This seemed to be connected with the bone. The knee joint was not swollen and appeared to be uninvolved. On December 17, 1900, I operated, making a long incision on outer surface of thigh over the deep swelling and discovered a condition of extensive periostitis. This was tubercular in character. After cleaning out thoroughly and making counter openings to procure free drainage the wounds were packed with gauze. At present, February 15, his condition is much improved, and the prospect for complete recovery is excellent.

Amœbic abscess of liver.—H. A. C., private, Company I, Sixth United States Infantry. Age, 21. Native of Kentucky. Admitted to *Relief* December 24, 1900, from United States hospital at Dumaguete, Negros, P. I. Diagnosis on transfer slip: Anæmia, acute. History: Had dysentery in 1899. Was in good health after this until September, 1900, when present trouble began. He first noticed pain just below costal border on right side, this radiated upward to the right shoulder. He had occasional attacks of nausea and vomiting. He had fever in evening and began to lose flesh. When admitted to the *Relief* his temperature was irregular, rising to 102° or 103° in evening, followed by sweats at night. The liver dullness was increased upward and downward. An exploratory puncture was made on December 27, and pus discovered in convexity of right lobe. I operated the same day by the transpleural method, removing 3 inches of ninth rib in axillary line. The diaphragmatic was stitched to the costal pleura. The liver was found to be not adherent to the diaphragm. A free opening was made into the abscess, which was situated about 1 inch below surface. Twelve hundred and fifty cubic centimeters of pus was evacuated. The anterior part of the wound through chest wall and diaphragm was closed, and a large drainage tube brought out of the posterior angle. The patient made an uneventful recovery. Discharge ceased one month after operation.

Operation for varicocele by the high method.—A. A S., private, Company K, Fortieth Infantry, United States Volunteers. Age, 27. Native of Canada. This operation was performed December 27, 1900, at Cebu, P. I. An incision 1½ inches long was made over cord downward from the external ring. The veins were separated from the vas deferens and drawn out of the incision. Ligatures were placed about the veins above and below, and the portion of the vessels included between the ligatures (about 2 inches) was removed. The ends of the ligatures, which had been left long, were then tied together, thus lifting the testicle and shortening the cord. Stitches were inserted and a capillary drain used for twenty-four hours, after which the incision was sealed by collodion.

Operation for acute gangreneous appendicitis.—G. D. B., private, Company A, Thirtieth United States Volunteers. Age, 22. Native of Michigan. Admitted to *Relief* January 25, 1901, from United States hospital, Lucena, Luzon, P. I. History: This patient had an attack of pain in right iliac region, associated with fever and vomiting, about nine months ago. Since that time has been well until present attack. On January 24, 1901, was suddenly taken with pain in abdomen, gradually becoming localized in right iliac region. When admitted to the *Relief* he had a temperature of 99.4° F., occasional vomiting, and marked tenderness in right iliac region, and rigidity of right rectus. The pain was increased by extension of right thigh. Operation was performed January 26, by an oblique incision. There were numerous old adhesions, imbedded in which was the appendix in a state of gangrene. The parts were so firmly tied down that in order to get sufficient room the original incision was extended. The appendix was ligated near its base and removed. Drainage by rubber tube and gauze was made. The patient took the anaesthetic very badly, and broncho-pneumonia set in on January 27. There was a considerable discharge of pus through the drainage tube for about a week, after which it gradually decreased in amount. The pneumonia, after several days, rapidly improved, and from this time recovery was uneventful.

Operation for the radical cure of hernia (*Bassini's method*).—C. B., private, Company C, Forty-fifth Infantry, United States Volunteers. Age, 24. Native of Indiana. Admitted to *Relief* January 29, 1901, from post hospital at Nueva Caceres, Luzon, P. I. The hernia in this case appeared about eight months ago. It was a complete, oblique inguinal hernia, left side. This operation presented no peculiar features. Kangaroo tendons used for deep sutures. Recovery uneventful. Union primary.

Operation for varicocele by the high method.—J. B. M., private, Company C, Forty-fifth Infantry, United States Volunteers. Age, 27. Native of District of Columbia. Admitted to *Relief* January 29, 1901, from post hospital, Nueva Caceres, Luzon, P. I. This case presented no peculiarities. Union was primary and recovery uneventful.

Suprapubic cystotomy for vesical calculus.—J. B., private, Company H, Forty-seventh Infantry, United States Volunteers. Age, 28. Native of Pennsylvania. Admitted to *Relief* January 27, 1901, from post hospital at Sorsogon, Luzon, P. I. History: In 1895 the patient first began to have trouble with his urinary apparatus. At that time he had to get up at night to pass water. He gives a history of renal colic. The active symptoms manifested themselves about a year ago. He had some pain in back and passed bloody urine at times. He has had increased frequency of micturition, stopping of the flow, pain after urination, etc. He was admitted to the *Relief* with a diagnosis of chronic cystitis. His urine was alkaline and foul smelling. On passing a sound a large stone was discovered. On February 7, 1901, I performed the suprapubic operation and removed a large calcium oxalate stone, which measured about 2¼ inches in its longest diameter, and in its shortest diameter about 1½ inches. It weighed 92 grams. Specimens of calcium oxalate stones of this size must be very rare; therefore I have sent this to the Army Medical Museum. The operation presented no unusual features except, of course, the large incision in the bladder for the removal of the stone. At present the patient is doing well and the cystitis is rapidly improving. The wound in the bladder is not sutured. Capillary drainage with gauze.

Operation for abscess of liver.—C. O'D., private, Company K, Fortieth Infantry, United States Volunteers. Age, 23. Native of Ireland. Admitted to *Relief* February 9, 1901, from United States hospital at Cagayan, Mindanao, P. I. Diagnosis on transfer slip: Acute hepatitis following dengue. History: This patient states that he was feeling well until February 4, 1901, at which time he was taken with nausea, vomiting, gradually increasing pain and tenderness in the epigastrium, and fever. When admitted he had a temperature of 102° F. in evening; pulse about 100; skin hot and dry; occasional vomiting. There was considerable dullness, and the patient's condition was very like the third week of a severe case of typhoid, with the exception of the pulse, which was below 100. There was a prominence of the epigastric region. I operated on February 10, making a median incision 2½ inches long through the abdominal wall just below the ensiform cartilage. On finding the liver adherent, I incised it and evacuated about 1,000 cubic centimeters of pus from the left lobe. Washed out cavity thoroughly and drained with two large tubes. The patient at present, February 16, is not doing very well. His temperature remains high, and signs of pyæmia are more marked. There are probably other collections of pus not yet discovered.

Notice: This patient died on February 28, 1901. Autopsy showed large abscesses of left lobe of liver, extending for a considerable distance into right lobe. The under surface of liver was adherent to anterior surface of stomach near pylorus. Spleen enlarged and softened. The other abdominal organs were apparently normal. Pericardium contained two ounces of clear straw-colored fluid. Both lungs were bound down to chest wall by old adhesions. Upper lobe of left lung was the site of numerous small abscesses.

Operation for radical cure of hernia (*Bassini's method*).—A. B. B., corporal, Company F, Thirty-first Infantry, United States Volunteers. Age, 23. Native of Ohio. Admitted to *Relief* February 8, 1901, from military hospital at Zamboanga, Mindanao, P. I. Operation February 11, 1901. This was a case of recent hernia. The operation presented no special features. Kangaroo tendon used for deep sutures. Union primary.

C. M. T., private, Company H, Thirty-first Infantry, United States Volunteers. Age, 30. Native of Kentucky. Operation February 11, 1901. This hernia was incurred in October, 1900. The neck of the sac was large. The operation presented nothing special. Kangaroo tendon used for deep sutures. Union primary.

ABSTRACTS FROM THE RECORDS OF THE UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL.

The following table of operations and results comprises the surgical work performed at this hospital during the past fiscal year. In addition to the usual records kept in such cases, a surgical report of each operation is forwarded to the Surgeon-General, and a complete clinical history, with a copy of the surgical report, is kept on file in this hospital. All of the operative work has been performed by the commanding officer of the hospital. A short review of the surgical work may be of interest.

Total number of surgical cases admitted to the ward during the fiscal year has been 372, divided as follows:

Regulars	187
Volunteers	153
Discharged soldiers	15
Civilians	17
Total	372

There have been 194 surgical operations performed by the commanding officer during the year, divided as follows:

Regulars	90
Volunteers	73
Discharged soldiers	14
Civilians	17
Total	194

The following is a tabulated list of the operations and results:

Operation and character.	Total.	Recovered.	Died.	Remarks.
Abscess:				
Hepatic	3	3		
Ischio-rectal	1	1		
Adenitis, nontubercular	1	1		
Appendicitis:				
Acute	1	1		
Recurrent	19	19		
Amputation:				
Right thigh	1	1		
Large toe, right	2	2		
Third finger, right	2	2		
Right leg, conical stump	1	1		Reamputation.
Left leg, upper third	1	1		
Aneurism:				
Popliteal	1	1		Result of gunshot wound left leg.
With varix, left temporal	1	1		
Cartilage displaced, right knee	1	1		
Contraction, palmar fascia	1	1		
Empyema:				
Sequel of gunshot wound	1	1		Wound received in 1877.
Sequel of pneumonia	7	6	1	
Enucleation, 2 of right eye and 1 of left eye	3	3		
Fistula in ano	5	5		
Fracture, simple faulty union	3	3		
Hernia:				
Inguinal	35	34	1	Cause of death, œdema and congestion of lungs. Patient had just completed an extended spree, which was not known.
Ventral	5	5		
Hemorrhoids:				
External	8	8		
Internal	4	4		
Internal and external	8	8		
Hydrocele, tapping and injection	1	1		
Hammer toe, tenotomy	1	1		
Intestinal adhesions, laparotomy	2	2		
Ingrowing nail, removal with matrix	5	5		
Laparotomy, exploratory	1	1		
Mastoiditis, trephining mastoid	2	2		
Nerve stretching; median nerve, right; sciatic nerve, left.	2	2		
Phimosis, circumcision	5	5		
Tumors:				
Lipoma	2	2		
Fibroid	1	1		

Operation and character.	Total.	Recovered.	Died.	Remarks.
Tumors:				
Cysts, sebaceous	1	1	....	
Carcinoma of larynx	1	....	1	Tracheotomy performed; died about three weeks later from broncho-pneumonia.
Varicocele:				
Left, single	30	30	....	
Double	1	1	....	
Wounds:				
Gunshot	16	16	....	
Incised	1	1	....	
Varicose veins, legs	4	4	....	
Stricture, rectum	1	1	....	
Tonsils, tonsilotomy for hypertrophy	1	1	....	
Total	194	191	3	

ABSCESS OF THE LIVER.

Three operations for this condition were performed, all of which recovered. In no case was the amœba of dysentery found, and in two cases there was no evidence of the previous existence of dysentery. In one case, that of a recruit, the patient had never been out of the United States.

S. A., private, Battery L, Third Artillery.—Patient was admitted to this hospital on December 11, 1900, from the Philippine Islands, and was found to have a small fluctuating tumor upon the right side of the abdomen. This was only slightly tender and gave very little discomfort. He gave a history of having had malaria in the Philippine Islands, but said that he had never had dysentery or diarrhea. After a few days the tumor was found to be increasing slightly in size, and he had some rise of temperature in the evening. There was no jaundice or disturbance of the bowels.

Operation December 25, 1900: An incision was made over the most prominent part of the tumor in the abdominal wall just below the margin of the ribs. Quite a large amount of pus was found which was apparently confined to a localized area between the muscles. The discharge from the wound, however, was very profuse during the next few days, and while the wound was being dressed, about a week after the operation, a small sinus was found just below the margin of the ribs, leading beneath the abdominal wall. This was enlarged and found to communicate with a large abscess cavity involving the lower portion of the right lobe of the liver. This cavity was irrigated and drained, and the patient made a rapid recovery, being discharged on February 26, 1901, in good condition, the wound entirely healed.

E. J. O'N., private, Company K, Forty-second Volunteer Infantry.—The patient was admitted to this hospital on March 1, 1901, complaining of pain over the region of the liver and the lower portion of the right chest. This pain had been present since December, 1900. There was some evening temperature daily and a slight cough. Upon auscultation, the lower portion of the right chest was found flat and the voice and breathing sounds absent. He gave a history of having had dysentery in the Philippine Islands in July, 1900. Examination of the sputum for tubercle bacilli gave a negative result. An aspirating needle, introduced in the eighth interspace in the posterior axillary line, withdrew bloody pus.

Operation March 20, 1901: About 2 inches of the eighth rib was removed in the posterior axillary line. Immediately beneath this was found an abscess cavity about the size of a large orange, filled with thick bloody pus. This was shut off from the pleural cavity and extended along the diaphragm for some distance. It was thought that it communicated with the upper surface of the liver, although no opening could be found. The abscess cavity was irrigated and a drainage tube inserted. After the operation the wound healed readily and the patient was discharged from the hospital on April 22, 1901, with the wound entirely healed.

H. S., private, Twenty-eighth Company Coast Artillery.—Patient was admitted to this hospital on March 13, 1901, complaining of pain and tenderness over the right side of the abdomen. The patient was a recruit and had never been outside of the United States. He stated that these symptoms had been present for about a month. The bowels were constipated and there was an evening rise of temperature. He denied ever having had dysentery or other serious illness prior to the onset of the symptoms mentioned.

Operation March 22, 1901: An aspirating needle was introduced into the right side a little below the margin of the ribs, and revealed the presence of pus.

An incision was made through the abdominal wall at this point and a large abscess cavity opened, which extended upward beneath the lower surface of the liver and involved the right lobe. This cavity was irrigated and a drainage tube inserted.

Improvement was rapid after the operation and the patient was discharged from the hospital, the wound being entirely healed.

APPENDICITIS.

Nineteen operations for appendicitis were performed, recovery taking place in all the cases.

The technique of the operation has been somewhat modified by invaginating the stump of the appendix, the use of the gridiron incision, and the reduction in length of the skin incision, which in these cases has not been over three to four centimeters. The danger of hernia from this mode of operating is very much reduced and no case of such character has occurred.

The technique of the operation is improved by invaginating the stump of the appendix and covering in the invagination with a purse string suture of the bowel surrounding it. Further protection of the stump is obtained by a second suture surrounding the previous suture and about two-thirds of a centimeter beyond it. This double invagination, as it may be called, effectually walls off any secretion from the peritoneal cavity and reduces to a minimum the danger from sloughing of the appendicular stump.

The following case, that of Private J. A., is of especial interest. In this case the operation for appendicitis was performed about three weeks after an operation for the radical cure of hernia, which had been successfully performed at this hospital. Subsequent to the hernia operation the patient had experienced frequent attacks of pain in the right iliac region. He gave a history of having had these pains for several months at irregular intervals. The operation for appendicitis was performed in the usual manner, and the appendix removed. It was much swollen and congested and bound down by adhesions. Microscopical examination showed the typical appearances found in recurrent appendicitis.

About three weeks after the appendectomy he began to experience severe pain in the hypochondriac region of the right side. He had a slight rise of temperature daily, and gave a history of having fallen upon his right side in 1899, striking his body in the region in which the pain complained of was present. An exploratory operation was decided upon. On opening the abdomen, in the right semilunar line, many adhesions were found between the omentum and the transverse colon; the neighboring glands were much enlarged, and a portion of indurated tissue and several enlarged glands were removed. The liver and gall bladder appeared normal. For a few days his condition was somewhat improved, but the pains returned with greater intensity, and a well-marked tumor appeared beneath the wound. It was decided to open the abdomen in the line of the previous incision, which was accordingly done, and careful exploration discovered a hard indurated mass forming in the mesentery of the transverse colon. This mass was about the size of a small orange, and invaded the wall of the gut. The tumor was removed and about three inches of the transverse colon excised, the ends of the gut being united by a Murphy button. After the operation the wound closed readily and the patient improved rapidly, leaving the hospital in an apparently normal condition. Microscopical examination of the growth showed it to be of sarcomatous origin. At this date, six months after operation, no evidence of a recurrence of the growth has been observed.

ACUTE APPENDICITIS.

J. O'H., officer's son.—Patient was admitted to the hospital October 5, 1900. On admission there was moderate pain and well localized tenderness in the right iliac region. These symptoms had been present for ten days prior to admission. At the onset there had been some vomiting, several slight chills, and the bowels had been constipated. Patient gave a history of having had a similar attack six months before the present one. On the day following admission the temperature rose and his general condition appeared more serious.

Operation October 5, 1900: An incision was made through the abdominal wall at the outer side of the right rectus muscle, and a small localized abscess was found in the region of the appendix, shut off from the general abdominal cavity by adhesions. The appendix was found within this cavity in a gangrenous condition and ruptured. The appendix was removed, its stump cauterized, and the abscess cavity thoroughly washed out with salt solution. A drainage of iodoform gauze, surrounded by gutta-percha tissue, was left in the wound and the abdominal wall partly closed. No unfavorable symptoms followed the operation. The wound healed by granulation and the patient made a good recovery, leaving the hospital November 6, 1900.

M. C., private, Battery H, Fourth Artillery.—Patient was admitted to hospital February 10, 1901, complaining of pain and tenderness in the right side of the abdomen. These symptoms, together with constipation, nausea, and vomiting, had been present for several days. On examination well localized tenderness was found in the right iliac region, with some rigidity of the abdominal muscles. Upon admission the temperature was 100.2° F. and a few hours later became 102.6° F.

Operation February 11, 1901: The usual gridiron incision was made near McBurney's point. The appendix was found in its normal position, much swollen and congested, with numerous fresh adhesions, while the peritoneum of the intestine in the vicinity was much inflamed. The appendix was removed without difficulty, ligated with catgut, the stump cauterized with carbolic acid, and the peritoneum sutured over the stump. Patient made a good recovery from the operation, and was returned to duty in April, 1901.

J. T. W., recruit, unassigned.—He was admitted to the hospital on May 7, 1901, complaining of pain in the lower portion of the right side of the abdomen. Upon examination a small tender tumor was found in the right iliac region, a little above Poupart's ligament. There was no particular tenderness over McBurney's point. He had a temperature of 101° F.; a pulse about normal and of good quality; the bowels were regular and there was no nausea or vomiting. He had suffered from pain in this region for three days before admission. He was kept under observation for several days, but no particular change occurred in the symptoms, except that the evening temperature went up to 103° and 104° F., and an operation was decided upon.

Operation May 14, 1901: An incision was made through the abdominal wall over the tumor, a little above Poupart's ligament. A large abscess cavity was found extending well down into the iliac fossa. A large amount of pus was evacuated, together with some broken-down necrotic tissue. The appendix could not be found. The abscess cavity was localized and entirely shut off from the abdominal cavity. Patient made a good recovery from the operation.

RECURRENT APPENDICITIS.

J. D. C., private, Company H, Sixteenth United States Infantry.—Patient was admitted to this hospital on January 7, 1901, from the Philippine Islands. He gave a history of having had several attacks of appendicitis, the first in May, 1900. During each attack there had been abdominal pain and tenderness localized in the right iliac region, a moderate rise of temperature, and some nausea.

On admission there was slight tenderness in the region of the appendix, which he said had been present for several months. The bowels were regular. Five days after admission there was a slight attack of pain in the right iliac region with a rise of temperature to 99° F.

Operation January 14, 1901: An incision was made through the abdominal wall near McBurney's point, the muscle fibers being separated longitudinally, making the gridiron opening. The incision, as in all such cases in this hospital, was about 3 centimeters in length, while the opening through the fascia of the external oblique was made a little longer. This gives an increased working space, owing to the elasticity of the skin. The appendix was found in its normal condition and free from adhesions. It was, however, unusually long, much congested, and contained a fæcal concretion about the size of a pea. It was removed in the following manner: First the mesentery was ligated with catgut and the appendix freed to its base; next a circular incision was made through the peritoneal covering about 1 centimeter from its base and this portion turned back toward the cæcum, forming a cuff. The appendix was then ligated with medium-sized catgut, close to the intestine, excised, and the stump cauterized with pure carbolic acid. The cuff of peritoneum was sutured over the stump with fine silk, forming a complete covering.

The abdominal cavity was then closed in the usual manner, catgut sutures being used for the peritoneum and each layer of fascia, and a subcuticular silkworm gut suture for the skin. Patient made a good recovery, the wound closing by primary union, the sutures being removed on the eighth day.

P. C. C., private hospital corps, United States Army.—Patient was admitted to the hospital on February 1, 1901, and gave a history of having had several attacks of appendicitis. These attacks were characterized by well-localized pain in the right iliac region, some fever, nausea, and constipation. The last attack was in the Philippine Islands in January, 1900, and since that time, while there have been no definite attacks, he has always had a little tenderness in the region of the appendix. Upon admission there was some tenderness in this region and slight rigidity of the abdominal muscles.

Operation February 4, 1901: The usual gridiron incision was made through the abdominal wall near McBurney's point and the appendix found in its normal position. It was surrounded by many old, dense adhesions and the tip of it was very firmly adherent to the margin of the pelvis. It was removed, however, without difficulty, the stump was cauterized with pure carbolic acid and covered over with peritoneum. The abdominal wall was closed in the usual manner, catgut for the buried sutures and a subcuticular silkworm-gut suture for the skin. The wound healed without complications, and the patient was returned to duty March 5, 1901.

F. S., private hospital corps, United States Army.—Patient was admitted to the hospital February 13, 1901, and gave a history of having had a fall while carrying a litter in the Philippines in April, 1899. Since that time he has had frequent attacks of pain in the region of the appendix, these attacks coming on at intervals of a few months. Recently the attacks have become more severe, and have been attended with nausea and vomiting, constipation of the bowels, and well-marked localized tenderness. On admission his temperature was normal, but there was localized tenderness and rigidity of the abdominal muscles in the right iliac region.

Operation February 19, 1901: An incision was made through the abdominal wall a little to the right of the rectus muscle, near McBurney's point. The peritoneum of the abdominal wall was found much congested and œdematous, and upon carrying the incision through this a small abscess cavity was found close to the abdominal wall, and shut off from the general abdominal cavity by dense adhesions. The appendix was found in the midst of this cavity, ulcerated through, near its base. It was removed and the cavity irrigated; the abdominal wall was partially closed, a drainage being left consisting of strips of iodoform gauze surrounded with gutta-percha tissue. The patient made a good recovery without complications, the wound healing readily by granulation.

Mrs. K.—Patient was admitted to hospital on March 5, 1901, with a history of having had several attacks of appendicitis extending over a period of about two years. Since January, 1901, there have been constant pain and tenderness in the right side of the abdomen, some fever at times, marked disturbance of digestion, and constipation of the bowels. Upon examination, well-marked tenderness was found in the region of the appendix, also rigidity of abdominal muscles of the right side.

Operation March 6, 1901: An incision was made through the abdominal wall a little to the right of the rectus muscle. The fascia and muscle were separated longitudinally making the gridiron incision. The appendix was found much enlarged and congested and bound down by numerous old and recent adhesions. It was liberated and removed and found to contain large fæcal concretions. The stump was cauterized with pure carbolic acid and invaginated into the wall of the colon. The wound was then closed in the usual manner and the patient made a good recovery without complications.

S. A. H., musician, Company G, Thirty-ninth United States Volunteer Infantry.—Patient was admitted to this hospital July 21, 1900, convalescent from malaria and typhoid fever, which he had contracted in the Philippine Islands. Since January, 1900, he has had several attacks of pain in the right iliac region with marked abdominal tenderness and constipation. There was no nausea or vomiting, but a slight rise of temperature.

Operation August 13, 1900: An incision was made through the abdominal wall to the outer side of the right rectus muscle, the muscular fibers being separated longitudinally making the gridiron incision. The appendix was found in its usual position surrounded by many adhesions and much swollen and congested at the extremity. It was removed without difficulty and the peritoneum sutured over the stump. The abdominal wall was closed in the usual manner and the patient made an uninterrupted recovery.

CHRONIC PERITONITIS WITH INTESTINAL ADHESIONS.

H. D. B., private, Company K, Fourth Infantry.—The patient was admitted to the hospital on September 23, 1900, from the Philippine Islands. He gave a history of having had, for several months, frequent attacks of pain in the right iliac region, accompanied by moderate abdominal tenderness; but there was no fever or vomiting with the attacks. After being kept under observation for some time, it was thought that the patient was suffering from chronic appendicitis and an operation was performed and the appendix removed on October 18, 1900. The appendix was found somewhat congested and bound down by numerous adhesions. It was removed in the usual manner, the adhesions broken up, and the patient made a good recovery. About three weeks after the operation the pain returned, at which times there was knotting of the intestines in the right iliac region from the accumulation of gas, and it was decided to reopen the wound and relieve the adhesions.

Operation December 1, 1900: An incision was made through the cicatrix of the former wound in the abdominal wall. Many recent adhesions were found about the lower end of the ileum and the cæcum matting the intestines rather firmly together, and scattered over the peritoneum of this region were numerous small deposits which looked like miliary tubercles. The adhesions were broken up, the intestines liberated, and the abdominal wall closed layer by layer, catgut being used for buried sutures and silkworm gut for the skin. The wound healed without complication and for a time the patient's condition was improved, but the attacks of pain soon returned, although his general condition became fairly good. He was discharged on surgeon's certificate of disability January 17, 1901.

ANEURISM, CIRSOID.

R. C. B., private, Company I, Twenty-fifth United States Infantry.—Patient was admitted to hospital September 23, 1900, suffering from a cirsoid aneurism of the temporal artery anterior to the left ear. He gave a history of a fall in the Philippine Islands in December, 1899, striking on the left side of his face, and about a month later noticed an enlargement and pulsation of the artery in front of the left ear.

Operation September 29, 1900: The dilatation of the vessel extended along the side of the face anterior to the left ear for about one inch and a half, and this portion of the vessel was removed after numerous ligations of the temporal artery and its branches. Considerable bleeding was encountered at the operation, but it was easily controlled. The wound healed rapidly, and there has been no recurrence of the condition.

EMPYEMA.

Eight cases of this character were operated upon by resection of a portion of one or more ribs, and all recovered save one. This case was so extremely debilitated on admission to the hospital from malarial fever and dysentery, contracted in the Philippines, that when he subsequently developed pneumonia of the left lung, followed by empyema, there was very little hope of his recovery, and although the operation was performed as rapidly as possible, his already weakened condition militated against the normal reaction, and he died in forty-eight hours from exhaustion.

The following cases illustrate the conditions present in these operations:

H. R., retired soldier.—Had been shot in the right chest in 1877, and since that time had had occasional pain in the right scapular region, posteriorly. The physical examination of the chest revealed marked flatness over the middle line posteriorly of the right side, and a few inches below the lower border of the scapula. An aspirating needle introduced between the sixth and seventh ribs revealed the presence of pus. He was operated upon, and 1½ inches of the sixth and seventh ribs were removed in the anterior axillary line. The pleura was found much thickened and adherent to the chest wall. Upon incising this an abscess cavity the size of a large orange was discovered, the wall of which was covered with a thick calcareous deposit. The cavity was washed out, a large portion of the calcareous lining removed, and a drainage tube left in the wound. The patient's condition improved very rapidly and the cavity contracted to a small sinus. A slight discharge still came from the sinus when the patient left the hospital, but he was otherwise well.

A. E. A., musician, Company A, Forty-sixth United States Volunteer Infantry.—The patient was admitted to the hospital on May 18, 1901, from the transport *Sheridan*, with a pneumonia of the lower lobe of the left lung, which had been present since May 14. On admission his temperature was 102° to 104° F., and during the next ten days it fluctuated between 98° and 104° F. His pulse was rapid, generally about 120. On May 30 the diagnosis of empyema was made, and an aspirating needle introduced into the fifth intercostal space in the anterior axillary line revealed the presence of pus.

Operation May 30, 1901: A portion of the fifth rib was removed in the anterior axillary line, the pleural cavity opened, and a large amount of pus evacuated. The cavity was irrigated with a weak solution of lysol and a drainage tube inserted. The wound healed without complications, the patient making an uninterrupted recovery.

J. B., private, Company D, Thirtieth United States Volunteer Infantry.—Patient was admitted to the hospital on April 12, 1901, with measles. A few days after admission he developed pneumonia of the lower lobe of the right lung. On May 9 there were signs of fluid in the right pleural cavity, and an aspirating needle introduced in the seventh interspace showed the presence of pus.

Operation May 11, 1901: About 1½ inches of the seventh rib was removed in the posterior axillary line; the pleural cavity was opened and a large amount of pus evacuated. The cavity was irrigated with a weak lysol solution, and a drainage tube inserted. At the time of the operation the patient was in a very poor condition, but he soon began to improve; the lung expanded, the abscess cavity became reduced in size, and he was discharged from the hospital cured.

GUNSHOT WOUNDS.

Sixteen operations were performed during the year upon cases suffering from gunshot wounds. The character of the operations will be seen from the following illustrative cases:

H. O. R., quartermaster's employee.—The patient was admitted to this hospital August 4, 1900, suffering from pain and weakness in the region of the left hip joint, the result of gunshot wound received in the Philippines March 1, 1900, when he was in the employ of the Quartermaster's Department, United States Army. The bullet struck the left side of his cartridge belt, exploding two shells, and all three bullets entered the outer side of the left hip. Examination by the X-ray revealed the presence of a foreign body just above the capsule of the hip joint.

Operation August 9, 1900: An incision was made in the left gluteal region and the fibers of the muscles were separated longitudinally. The bullets were found in the position indicated by the radiograph just above the capsule of the hip joint, and were easily removed from that position. The wound was then irrigated and closed in the usual manner. It healed by primary union and the patient made a perfect recovery, being discharged from the hospital on September 25, 1900, with the functions of the joint practically restored to their normal condition.

F. H., private, Company K, Fourth Infantry.—The patient was admitted to this hospital April 3, 1900, suffering from gastro-enteritis. He also had a bullet in the left side, the result of a gunshot wound received in the Philippine Islands. The bullet entered the outer aspect of the left thigh near the middle with no wound of exit. A careful examination with the X-ray showed the bullet to be located near the middle of the thigh close to the outer side of the femur.

Operation August 22, 1900: An incision was made through the scar left by the wound of entrance, but this failed to locate the bullet and another incision was made on the posterior aspect of the thigh, and through this the bullet was easily removed. The wounds healed readily, and the patient was discharged on October 19, 1900.

G. E. G., captain, Thirty-fourth United States Volunteer Infantry.—The patient was admitted to the hospital September 24, 1900, suffering from the effects of a gunshot wound of the left side of the lower jaw and of the right shoulder, which had been received in action in the Philippines on July 22, 1900. On admission to this hospital there was a sinus leading down to the lower jaw near the angle, from which there was a moderate discharge. There was also a sinus through the spine of the right scapula, the upper opening being a little behind the clavicle and the lower one a little below the middle of the scapula. The patient's general condition improved, but the sinuses remained with a moderate amount of discharge, evidently due to the presence of necrosed bone.

Operation October 28, 1900: The sinuses were enlarged and several pieces of necrosed bone removed, both from the angle of the jaw and from the shoulder. The wounds were then thoroughly curetted and packed with iodoform gauze. After this operation, the wound in the shoulder healed rapidly and was entirely closed at the end of four weeks. The wound at the angle of the jaw partially healed, but a small sinus remained, apparently caused by discharge from the parotid gland, the duct of which had been cut at the time of the injury.

F. R. L., second lieutenant, Ninth United States Infantry.—The patient was admitted to the hospital October 19, 1900, suffering from the effects of a gunshot wound received in action in China July 13, 1900. There was paralysis of the right arm, and considerable pain in this arm and right shoulder. Examination with the X-ray revealed the presence of a bullet in the right side of the neck which had entered near the middle of the right scapula.

Operation October 24, 1900: After the patient was anæsthetized the bullet could easily be felt at the base of the right side of the neck, near the transverse process of the sixth cervical vertebra. It was removed from this position without much difficulty through a small incision. The wound healed readily by primary union, no complications resulting. After operation the condition of the arm improved somewhat, but its function was not fully restored.

J. S., private, Company M, Fourteenth Infantry.—The patient was admitted to the hospital October 19, 1900, with paralysis of the left forearm and hand, the result of a gunshot wound received in action in China on August 6, 1900, through the upper part of the left arm. There was complete paralysis of the muscles supplied by the musculospiral nerve.

Operation November 13, 1900: An incision was made on the outer aspect of the arm over the musculospiral groove down to the nerve, in order to see if this had been severed at the time of the wound. The nerve was found intact, but compressed by the callus which was thrown out from the fractured end of the bone. It was liberated from this position and raised up into the soft tissues and the wound was then closed. The wound healed readily after the operation, but the condition of the forearm and hand remained practically the same. The patient was discharged on surgeon's certificate of disability.

A. C., private, Company D, Thirty-ninth United States Volunteer Infantry.—Patient was admitted to the hospital on February 3, 1901, suffering from partial paralysis of the right hand and constant pain in the palm of the hand, the thumb and fingers supplied by the median nerve, the result of a gunshot wound received in the Philippines in September, 1900, the bullet passing through the lower third of the right arm, shattering the humerus. The most important symptom for which the operation was performed was the excessive pain from which the patient suffered almost continually.

Operation February 10, 1901: An incision was made just above the elbow, over the line of the median nerve. The nerve was found surrounded by dense cicatricial tissue. In the lower portion of the wound two pieces of the jacket of the bullet were found pressing upon the nerve and partially embedded in the substance. These were removed and the nerve freed from adhesions. Almost immediately after the operation the pain disappeared. The wound healed rapidly and the condition of the patient was very much improved. He was discharged from the hospital February 20, 1901.

VENTRAL HERNIA.

Five cases of ventral hernia were operated upon during the year, all of which were the result of operation or injuries in the Philippine Islands. The results obtained after operation in this hospital were very satisfactory. The two following cases will show the character of these operations:

F. M., private, Company M, Twenty-ninth United States Volunteer Infantry.— Patient was admitted to the hospital February 3, 1901. He had a moderate-sized ventral hernia, which was the result of an operation for appendicitis performed in the Philippines in February, 1900.

Operation February 13, 1901: The old cicatricial tissue of the skin and fascia was removed and the incision extended through the abdominal wall. The peritoneum was found much retracted, with the omentum adherent to its edges. These adhesions were broken up and the wound closed after the manner of a fresh incision by suturing the peritoneum and the different layers of fascia separately. The skin was closed with a sub-cuticular silkworm gut suture. Patient made a good recovery, and left the hospital March 19, 1901.

T. S., discharged soldier.—Patient was admitted to the hospital on January 7, 1901, and was found to have a small ventral hernia in the right iliac region, which followed an operation for appendicitis performed in the Philippine Islands.

Operation January 9, 1901: The cicatrix of the old wound was excised and an incision made through the abdominal wall over the hernia. In the lower portion of the wound the abdominal wall was very much thinned out by separation of the muscles and fascia so that the hernia projected close to the skin. The different layers of the abdominal wall were isolated as far as possible, and the wound closed after the manner of a fresh incision, each layer, including the peritoneum, being sutured separately. Catgut was used for the buried sutures and silkworm gut for the skin. The wound closed by primary union and a good result was obtained.

INGUINAL HERNIA.

Thirty-five cases of inguinal hernia were operated upon, of which 34 recovered with good results and 1 died. This patient was a discharged soldier who had suffered much from illness in the Philippines, and whose general condition was very poor owing to prolonged dissipation since his return from the Orient. These facts were not known at the time of the operation. He took the anæsthetic very badly and died of congestion and œdema of the lungs.

The usual Bassini operation was performed in these cases, and the material found most suitable for sutures was catgut for the buried sutures and silkworm gut for the skin sutures, by the subcuticular method.

The following cases illustrate the character of these operations:

J. A. J., sergeant, Company I, Thirty-fifth Infantry, United States Volunteers.—Patient was admitted to the hospital July 28, 1900, with a moderate-sized indirect inguinal hernia of the right side, the result of a fall in January, 1900, in the Philippines.

Operation August 8, 1900: The usual Bassini operation was performed in this case. The operation was rendered more difficult on account of firm adhesions between the sac and the scrotal tissues. The omentum was also closely adherent to the wall of the sac. The sac protruded on both sides of the epigastic vessels, forming both a direct and indirect hernia. The sac, however, was reduced without much difficulty and ligated external to the epigastric vessels, and the wound closed in the usual manner. Patient made an uninterrupted recovery.

R. V. S., M. D.—The patient was admitted to the hospital July 26, 1900, with a moderate-sized, indirect inguinal hernia on the left side, which had been present for about eighteen months.

Operation July 28, 1900: The Bassini operation was performed, but was rendered more difficult than usual on account of a very thick abdominal wall. The internal ring was also very large. In this case the internal ring was closed with sutures of chromicized catgut. Ordinary catgut was used for the superficial buried sutures and the wound closed in the usual manner. At the end of six days after the operation there was a slight rise in temperature and a small accumulation of purulent fluid in the lower portion of the wound. This was drained out and the wound irrigated and packed with iodoform gauze. No other complications followed and the patient made good recovery.

E. S., chief trumpeter, Third Artillery band.—The patient was admitted to the hospital on May 22, 1901, with an indirect inguinal hernia of the left side. The hernia was small and was a recurrence after an operation on this side, two and a half years ago.

Operation May 25, 1901: The regular Bassini .operation was performed, but was rendered a little more difficult than usual on account of some old scar tissue from the previous operation. The operation was concluded in the usual manner, the wound healed by primary union with excellent results.

J. L., private, Company A, Twenty-first Infantry.—Patient was admitted to this hospital October 19, 1900, from the Philippines. He had a moderate-sized direct inguinal hernia in the left groin, the result of a fall in May, 1900. He was suffering from the effects of chronic dysentery and malaria, on his admission here, and was kept under treatment for these conditions for some time before it was thought best to operate.

Operation December 12, 1900: The usual Bassini operation was performed and the hernia sac was found to be small and protruded internal to the deep epigastric vessels, making a direct inguinal hernia. No complication arose during the operation and it was completed in the usual manner with catgut for the buried sutures and a sub-cuticular silkworm gut suture for the skin. The wound healed by primary union and the patient was sent to duty in good condition on January 20, 1901.

INTERNAL AND EXTERNAL HEMORRHOIDS.

Twenty operations for hemorrhoids were performed during the year, of which 8 were for external hemorrhoids, 4 for internal hemorrhoids, and 8 for combined external and internal hemorrhoids. The method of operation was by ligation, the tumors being held by a clamp, the skin and mucous membrane incised about their base, then ligated with silk and removed. The following case is illustrative of all these operations:

M. P. W., private, Company C, Thirty-third Infantry, United States Volunteers.—Patient was admitted to this hospital January 7, 1901, suffering from rather large hemorrhoids, which were found to be both internal and external to the sphincter. He had suffered from chronic diarrhea in the Philippine Islands and had noticed the hemorrhoids for several months.

Operation January 17, 1901: The tumors were held by a clamp and the skin and mucous membrane incised at their base when they were ligated with silk and removed. At the conclusion of the operation a small glass tube wound with strips of iodoform gauze was inserted in the rectum just through the sphincter so as to enable the patient to pass gas without difficulty. The bowels were moved after five days and a good result was obtained from the operation. He was discharged from the hospital on February 5, 1901.

NERVE STRETCHING.

Two operations of this character were performed, in one case the median nerve and in the other the sciatic nerve being stretched. The conditions present were such that a partial paralysis existed in the extremity, this condition resulting in both cases from gunshot wounds affecting the nerve. Slight improvement was shown in both cases, but full restoration of function did not occur.

VARICOCELE.

Thirty-one cases of this condition were operated upon by the suprapubic method, reported upon in Circular No. 3, S. G. O., February 27, 1901. This operation gives the most successful results, especially in the avoidance of sepsis and in maintaining the circulation by retention of a sound vein of the plexus. For further safety, after the veins are ligated, the ends of the ligatures are anchored to the external ring. The deep and superficial fasciæ are then carefully separated and united by continuous catgut suture and the skin by a subcuticular suture of silkworm gut.

The following case is inserted as an illustration of the general character of these operations:

F. F., private, Company H, Fourteenth Infantry.—The patient was admitted to this hospital October 19, 1900, convalescent from chronic diarrhea and heat prostration which occurred in China in 1900. He presented a moderate-sized varicocele of the left side which he first noticed in December, 1899.

Operation November 12, 1900: The usual operation for varicocele was performed, a small suprapubic incision being made and a portion of the enlarged vein excised. The ends of the vessels were joined together with catgut and the ligatures anchored to the external ring. The wound was closed with catgut for the deep sutures and silkworm gut, by the sub-cuticular method, for the skin. The patient made a good recovery from the operation, although convalescence was somewhat retarded by frequent attacks of severe headache, evidently a sequel of the heat-stroke above mentioned.

GUNSHOT WOUND OF BRAIN, REPORTED BY J. CARLING, LIEUTENANT AND ASSISTANT SURGEON, THIRTY-FIFTH INFANTRY, UNITED STATES VOLUNTEERS, NOVEMBER 14, 1900.

I have the honor to report the following interesting case of penetrating gunshot wound of head: The patient, a Filipino boy, age 16, was wounded by a .30-caliber Krag-Jörgensen bullet during an attack by insurgents on the town of San Miguel de Mayumo, Luzon, P. I., on the night of October 13, 1900. The patient was admitted to hospital one hour after receipt of injury with complete hemiplegia, left side. Temperature was 100, pulse slow and full, respiration normal. There was some nausea and vomiting and retention of urine. Pupils were dilated; special senses were not affected, but there was some loss of sensation on paralyzed side. Consciousness was retained, patient being very restless and talkative. Inspection showed the entrance of bullet on right side of head directly over the posterior border of the fissure of Rolando, 1¼ inches to right of median line. The wound was circular in shape, half an inch in diameter, and filled with clotted blood, hair, and débris. There was no wound of exit. The wound was irrigated with a solution of bichloride of mercury 1 to 2,000, foreign particles removed, and antiseptic dressing applied. On the following morning the patient's temperature was 101° F., and, as his general condition was otherwise unchanged, the operation of trephining was performed, assisted by Contract Surg. E. N. Bowen. After thoroughly shaving and cleansing the head, the patient was placed under chloroform anæsthetic and crucial incision made in scalp, extending an inch on either side of wound. When the flaps were retracted, a circular hole was revealed in the skull, one-third of an inch in diameter, with roughened and depressed margins, and beneath the torn dura were clots of blood, loose hairs, small fragments of bone, and broken-down brain tissue. The inner table also was found to be splintered. In order to obtain better access to the injured brain, with a view to removing the foreign bodies embedded therein, the trephine was used, and two buttons of bone, each one-quarter of an inch in diameter, were cut out on either side, while the elevator and rongeur forceps were used to elevate and trim the rough margins. Fifteen pieces of bone in all were removed, some being embedded in the brain half an inch beneath the dura. An attempt was then made to locate the bullet. By means of a blunt probe of soft metal its course was followed a distance of 4 inches in a direction downward and backward at an angle of 45°, after which it was lost. Deeming further probing dangerous to the life of the patient, the wound was thoroughly irrigated with a warm solution of boracic acid, packed with iodoform gauze, and the scalp sutured with interrupted sutures of silk, leaving a small opening below for drainage. On the day following operation the patient's condition greatly improved. He complained of very little pain and was less talkative and restless. The nausea and vomiting had ceased and he had full control over urine, but there was no change on the paralyzed side. His temperature was 99.5° F.; pulse, 80; respiration, 20. On October 17, forty-eight hours after operation, his temperature reached normal, and remained so until the end of his convalescence. On October 23 patient was able to move toes and ankle on paralyzed side. On October 28 he was able to raise the entire left lower extremity from bed and was slowly regaining power in upper extremity. As the paralysis cleared up normal sensation returned, and at time of making this report the patient has almost entirely recovered from the paralysis with a clean wound and a sound body. The wound in head, having been frequently dressed, healed by granulation from side to bottom, leaving only a slight scar to mark the entrance of bullet. The latter is now undoubtedly becoming encapsulated at the base of brain, and it will be interesting to know if ill results follow.

With this end in view, the patient will be kept under observation as long as possible and report made later if anything develops. * * *

SUPPLEMENTARY REPORT DATED MARCH 1, 1901.

I have the honor to present the following supplementary report of a case of gunshot wound of head, the original report covering operation having been made under date of November 14, 1900, a copy of which is herewith attached. As the patient is about to pass from under my observation it may prove interesting to note his present condition. Nearly five months have now elapsed since receipt of injury, during which time the patient has steadily improved. His mind is perfectly clear, sight, hearing, taste, and smell normal, and common sensation on hemiplegic side is not affected. The hemiplegia (left) has almost entirely disappeared, the only disability remaining being slight ankle-drop which is scarcely perceptible. Patient now attends school regularly, and is considered by his teacher the most promising pupil in his class. He has an excellent voice, and the injury to head and resulting operation has in no way affected it, so that he is again able to resume his place in church choir. The progress therefore in this case is excellent, and the occurrence of sequelæ in later years is, in my opinion, very unlikely.

Special Report of Cases of Frostbite Admitted to Hospital at Fort St. Micheal, Alaska, March 2, 1901, by R. G. Ebert, Major and Surgeon, United States Army.

James McNeill, miner, American, 49; John Callaghan, laborer, Irishman, 30, and Frank Madden, sailor, American, 34, were frozen by being imprisoned in a tent by snowdrifts, without fire or means of making same, on the trail to the Kuskokwim country while on a "stampede," 230 miles from St. Michael and 10 miles from the nearest native village, during a storm which raged over northwestern Alaska, January 20 to 28, 1901. Their cases were reported to military authorities at St. Michael on February 24, and a relief party sent out the following day, which brought them in, after a seven days' trip by dog teams, on March 2.

When they arrived at this hospital McNeill and Callaghan had both hands and Madden both feet frozen. Gangrenous odor very marked; extreme exhaustion from starvation (having lived on short rations of native food, dried salmon, etc., for twenty-nine days), exposure to climatic conditions, results of injuries, and lack of attention. While lying at this village they were unable to help themselves, and the natives showed great aversion to them and were reluctant to render the most trifling assistance.

Upon arrival here their wounds were cleansed and dressed, but owing to their exhausted condition no operative measures were taken until March 4, when McNeill, the strongest, was put on the table. All proximal phalanges and distal ends of first, third, and fifth metacarpal bones of right hand were denuded, soft structures beyond mummified with granulations and gangrenous tissues above points of denudation. The condition of the left hand was similar to that of the right, the points of denudation being the distal ends of first and fourth metacarpal bones, distal ends of second and third proximal phalanges, and fifth proximal phalanx. Right wrist also frozen, styloid process diseased, gangrenous slough about 2 inches in diameter directly over it; to a less degree this was also the condition of the left wrist. The index and ring fingers were disarticulated at the knuckle; distal ends of first, third, and fifth metacarpal bones had to be removed before sufficient tissue could be obtained to cover them. The styloid process was chiseled away and gangrenous tissue thoroughly curetted. Subsequently, on several different occasions skin-grafting was performed on the granulating surface with gratifying results. Constant cardiac stimulation was necessary throughout the operation. This condition precluded further operative procedures. March 9 the diseased tissues of left hand were removed in the following manner: Thumb amputated at distal end of metacarpal bone, index and middle fingers at distal third of proximal phalanges, and ring and little finger at metacarpo-phalangeal joints.

Tissues forming the flap over the distal end of fourth metacarpal failed to unite and required a secondary operation on April 6. Everything which showed the least signs of vitality was left at the time of operations. This necessitated a third appearance on the table, but, with the exception of the two phalangeal stumps on left hand, nothing of value could be saved. Wounds were entirely healed on May 10.

Callaghan's condition was as follows: Nervous prostration (constant tremors awake and sleeping) prevented operating prior to March 6. Line of amputation was approximately as follows: Distal third proximal phalanx of thumb, index finger at metacarpo-phalangeal joint, head of metacarpal bone of middle finger, distal third of fourth and middle of fifth metacarpal bones. A line, including a somewhat greater amount of structure, will define the points of operation on the left hand. Amputations on both hands were simultaneous, Dr. L. T. Mitchell operating on the left. Erysipelas developed in the left stump March 9. The patient was promptly isolated and all precautions used to prevent contagion. Two days after their inception the symptoms subsided. The flaps failing to unite, granulating surfaces were stimulated by grafts and cicatrization occurred in a surprisingly short period. Both stumps have been completely healed for six weeks and the man is able, with the remainder of his thumbs, using them against the second metacarpals, to perform all minor offices for himself.

Madden was in a wasted and anæmic condition. Excepting the feet, nothing but the left wrist was frozen. The right foot was a mass of diseased and denuded bone and gangrenous tissue. The destructive process was not so extensive in the left foot, the tarsal bones, with the exception of the posterior fourth of the calcaneum, not being involved and the line of demarcation being drawn through the proximal third of the metatarsal bones. On March 8 an attempt was made to operate, but before complete anæsthesia could be obtained his condition became so feeble that the operation was postponed. Under continued tonic treatment and stimulation amputation of right foot 3 inches above the ankle joint by antero-posterior flap was performed with complete union in two weeks. Owing to manifestations of malaria ("Chagres fever," contracted in 1896) operation on left foot had to be postponed until April 10, when amputation through the upper third of the metatarsals and removal of the posterior fourth of the os calcis was performed. Diseased soft structures of heel were so extensive that in after treatment recourse was had to frequent skin grafts. Union here was slow but complete on May 20.

As it was desired to save as much as possible of the hands and feet, operations were performed through tissues which had been frostbitten, and in no instance, except in Madden's right limb, was there immediate union, and with only this exception the operations were necessarily not aseptic.

Ether was the anæsthetic used, being administered by Hosp. Steward John L. Henderson. Acting Hosp. Steward Alexander T. MacPherson was the able assistant in all operations. To both much credit must be given for the success obtained. The nursing of these men by the members of the hospital corps at this post under the charge of Acting Steward MacPherson has proved a severe and arduous addition to their duties. It was cheerfully performed and is worthy of high praise.

Report of Observations on the Organization and Service of the Medical Department of the German Army Made during July, 1901, by Capt. John S. Kulp, Assistant Surgeon, United States Army.

The medical and sanitary service of the German army is a separate staff division and has advisory superintendence of matters pertaining to the health of the troops, command of medical officers above the rank of major, and partial control of those in the junior grades. Its personnel is divided into (1) General-Stabsärzte der Armee, with relative rank of brigadier; (2) General-Ärzte, chief surgeons of corps, relatively colonels; (3) General-Oberärzte, chief surgeons of divisions, lieutenant colonels; (4) Oberstabsärzte, regimental surgeons, majors; (5) Stabsärzte, battalion surgeons, captains; (6) Oberärzte (first lieutenants), (7) Assistenzärzte (second lieutenants), assistant surgeons; (8) Sanitäts-Feldwebel, usually a graduate in medicine, sergeant-major; (9) Sanitäts-Sergeant, sergeant; (10) Sanitäts-Unteroffizier, corporal; (11) Sanitäts-Gefreiter, lance corporal or first-class private; (12) Sanitäts-Soldat, private.

The officers of the permanent service are thoroughly trained in the specialty of military medicine, the principal school being the Kaiser-Wilhelms-Akademie für das Militärärztliche Bildungswesen at Berlin. After the usual five years' course they are commissioned, with the understanding that they are then only ready to begin their service as medical officers, the continuation of which will require constant study and intelligent observation throughout their whole career. The perfect internal discipline of the corps is manifest at every turn, and the earnestness and enthusiasm of the personnel is worthy of mention. The possibility of having graduates in medicine as noncommissioned officers is explicable by the condition of universal military service, and from their experience it would seem that a similar requirement for our hospital stewards would be in the interest of increased efficiency.

There is no such organization as our hospital corps, but men (after one year's service in the line) are transferred to various schools, where they receive six months' instruction. This course is thorough and systematic, especially for the gefreiter, a grade which corresponds to our lance corporal or first-class private. Briefly, this instruction consists of lectures, demonstrations, and recitations on the duties of the hospital assistant within and without the hospital, including the care of the sick in quarters. Some of the other subjects of special instruction are the duty of the sanitary soldier when orderly, when detailed for the swimming or other exercises of the troops, and when chief of a hospital department. Accounting, clerical work, and the duties of a monitor receive detailed attention, and the course in elementary anatomy and physiology is simple, practical, and thorough.

After this preliminary instruction the student goes on to that on injuries, first aid, contagious and infectious diseases, disinfection, emergencies, dressings, and a study of the ailments peculiar to soldiers. The transportation of the sick is taught by practical work in hospital and field, and this is followed by an admirable course on the "care of the sick soldier in a military hospital." The systematic arrangement includes the sick man, the sick bed, the sick watch, the position and comfort of the patient, the observation of symptoms, the administration of nourishment and medicine, and the carrying out of orders. After this the men receive practical and theoretical instructions designed to qualify them as operating room assistants, dispensary assistants, and on the making of necropsies. A feature of all the teaching is that it not only states what is expected of the sanitary soldier, but also what he is not to attempt.

Ambulance companies are commanded by line officers, under the direction of chief surgeons, as the medical department does not possess a separate administrative service. The usual allowance of personnel and transportation are—

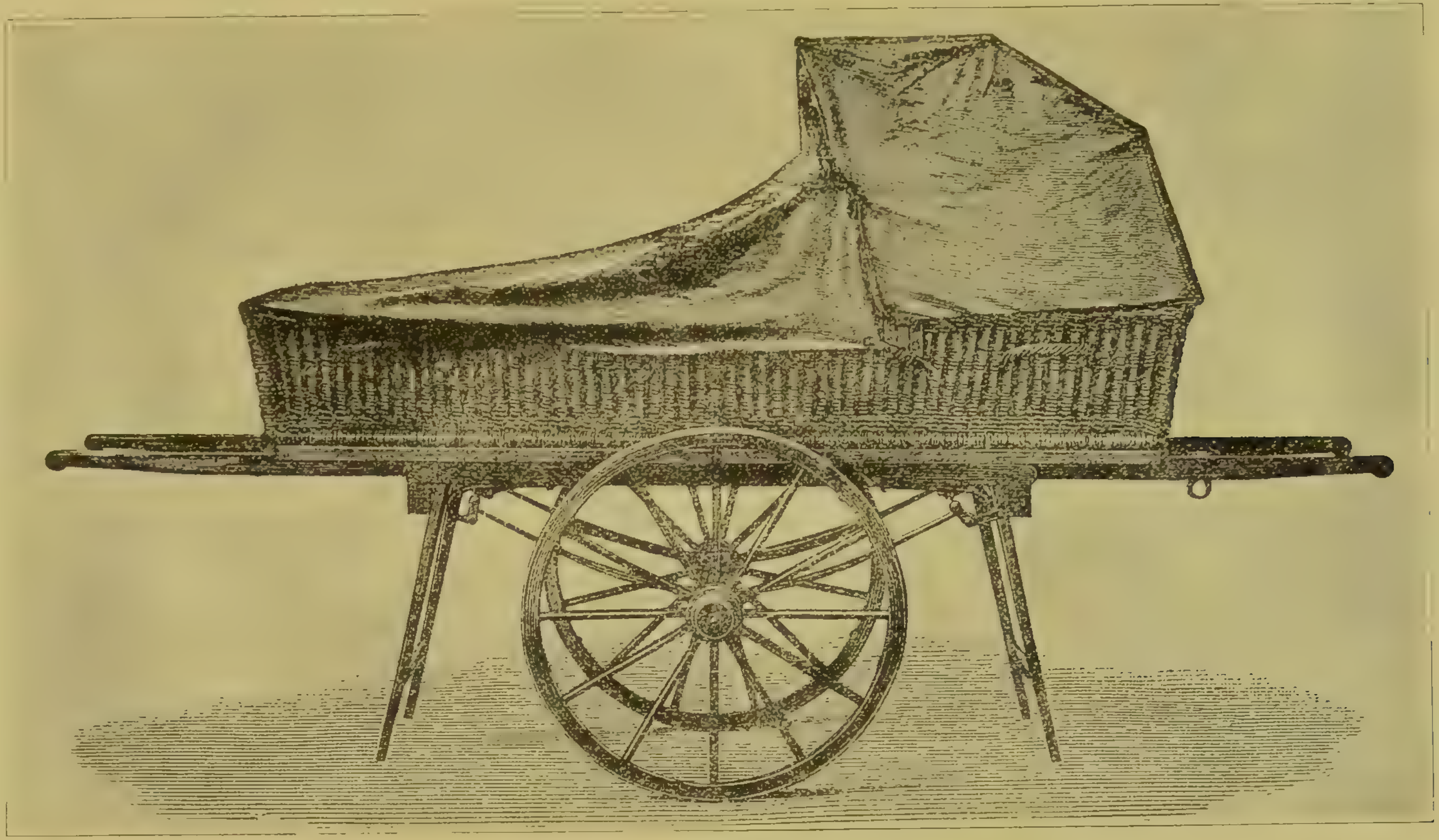
Medical officers	8
Line officers	3
Apothecary	1
Paymaster	1
Noncommissioned officers	14
Litter bearers (privates)	160
Other privates	67
Saddle horses	18
Draft horses	28
Wagon of "life-saving food"	1
Ambulance wagons	8
Wagons for dressings	2
Baggage wagons	2

To each army corps there are allowed 3 ambulance companies attached to divisions, and 2 held in reserve. The allowance of medical personnel to an infantry regiment of 3 battalions is usually 1 major, 2 captains, 3 lieutenants, 3 noncommissioned officers, and 12 privates in addition to the company bearers.

Medical department supplies.—In Germany, as in other countries which have learned the price of being unprepared for war, the medical department is in a position to take the field without delay. It is surprising to see in a country where comparative poverty among all classes is the rule rather than the exception, that the question of expense is hardly considered in the equipment of the army. The storehouses are of large size, well arranged, and clean. The officers in charge are alert and ambitious, and one of them was not only acquainted with the equipment of our own service, but had the proceedings of the Association of Military Surgeons, including the year 1899. The Train-Dépot des Garde-Corps, near Berlin, contains complete equipment for thousands of men in large brick storehouses with ample space. Painted chests are ready for packing, plainly marked on the outside with the names of the articles they are to contain, and on the inside so as to show the position of each piece. These chests are of suitable sizes to fit accurately into standard wagons and cars, and their contents are for the most part in small separate packages.

It is manifestly impossible to enumerate all the special features of interest, and indulgence is begged for the somewhat unsystematic method which is pursued in order to economize space.

The litters are of various patterns, but none seem so good as our own. The cover is laced on, and two heavy wheels with springs are provided so that one bearer can move it. All litters have large pockets and pillows, and one pattern of wheeled



A WHEELED LITTER, GERMAN ARMY.

Litter with a wicker body (illustration) is not unnecessarily heavy. The sling is part of the litter, as it should be, and chain slings with spiral springs are provided for use on trains. There is an issue of bedsacks, designed for straw, which have loops along the sides through which poles can be slipped, thus making an extemporized litter.

There has been much care taken in the proper equipment of improvised hospital trains, knocked-down lockers being kept ready for use, and a single broad, flat spring, which reaches across a freight car and holds the ends of four litters, is simple and practical. The regular hospital car is of the small size usual in Germany, and has twelve beds with hair mattresses, bed-side tables, two reclining chairs, one wheeled chair, hammocks for clothing, such as are used on Pullman cars, similar lavatories to those in the cabins of steamers, and various lockers for supplies. The beds can be lifted off and used as litters, and are arranged on a simple system of springs allowing universal motion. The canvas bottom is laced to a light hollow frame (as in our Lein-Irvine standee), and can be used without the mattress if desired. One car in each train is fitted up as a kitchen, and carries two steam ranges (taking steam from the locomotive), one coal range, ice chests, cooking utensils, dishes, and cutlery sufficient for 300 sick. An ordinary freight car acts as its tender.

The wagon transportation of the medical department consists of ambulances of four patterns, pharmacy wagons, bake wagons, and baggage wagons of several kinds. None are so well made as our own. The best ambulance is a large double-decked one, weighing 1,470 pounds, and requiring two or four animals. It carries an ambulance guidon above the center of the top during the day and a red lantern at night in addition to its side lights. This elevated position of the lantern commends itself. There is a rack for arms behind the high driver's seat. A form of ambulance used only in cities has rubber tires, and litters resting on large inflated rubber balls.

The pharmacy wagon is four wheeled, with a projecting hood over the rear, and a wide tail-board, which when down forms a dispensing table. The wheels cut under, the contents are well arranged and easily accessible, while forage is carried in a separate compartment below the body of the wagon, the weight of which is 1,700 pounds. As in the French service, all brakes are operated by either a wheel or crank.

The bake wagons are in pairs, one vehicle containing the oven, and the other the kitchen. They are each drawn by two animals, and can supply an hundred loaves an hour while en route.

The baggage wagons are heavy and are not adapted to American roads.

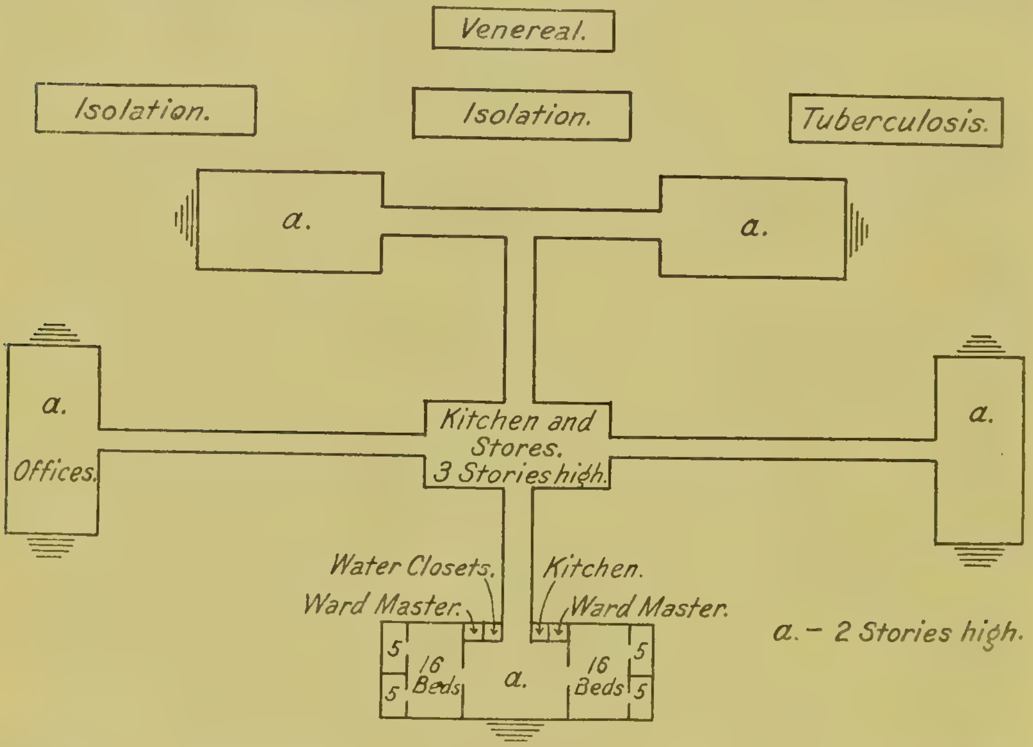
The instrument cases are well made and well arranged. Manganium, an alloy of manganese and aluminum, on account of its freedom from corrosion by disinfectants, has largely taken the place of aluminum, in spite of its greater cost. In this connection it may be said that after ten years' trial aluminum has not proved as valuable as was expected, and although still used for instrument handles, mess utensils, and to some extent as a constructive material, an order was in preparation prohibiting its use where a break would render useless a vehicle or implement. Seven new patterns of instrument cases have been recently adopted, and they appear complete and of good quality. The largest of these cases is 51 by 29½ by 15 centimeters, and some of its features are the use of glove fasteners to hold racks in place, the racks themselves being removable from the trays in order to facilitate sterilization and allow for the latter being used for solutions, the numbering not only of instruments, but also the place in the case where they belong, the flat thin shape of the pocket case (15 by 25 by 1 centimeters), and many minor details, such as thumb places on the small saws, rubber tipped percussion hammers, and Bergman's latest chisels. Every large hospital contains instruments and dressings for two field hospitals of 200 beds each; and these are always kept in immediate readiness for transportation.

Hospital administration.—The largest hospital visited was the Garnisonslazareth in Tempelhof, which contains 750 beds. This is a permanent general hospital, built some twenty years ago, and is a separate military unit, commanded by a major of the medical department, who reports to the surgeon-general. On account of the age of the buildings it would be unfair to criticise their construction and arrangement from a modern standpoint, the general plan being as follows:

The entire grounds are inclosed by a high brick wall and are beautifully laid out, a feature of all German hospitals being the lustplätze for the recreation of convalescents. In regard to the institution as a whole, the police was very good, the clothing and appearance of the personnel fair, and the discipline perfect. The personnel seemed to me to be overworked and the institution correspondingly undermanned. For instance, in this hospital of 750 beds, 359 were occupied on the day of my visit, and the working force consisted of but 72 persons. These received aid from several gardeners and the convalescents were used rather unsparingly, I thought. Structural defects in the heating and cooking arrangements added much labor, and there was an apparent lack of labor-saving appliances. The office work is not conducted on modern lines, the card system being unknown, and even typewriters but seldom used. A clean-cut system of recording and indexing appears much needed by European services.

Among the special features of this hospital are a well-equipped gymnasium containing machines for almost every form of passive motion, and an unusually complete X-ray department adjoining the operating rooms, which had the only females I saw in the institution—several wrinkled old hags, with kind faces. Almost every ward has its own kitchen, in addition to that for the general mess. This latter was clean and well managed, and had as its personnel a commissioned inspector, 1 noncommissioned officer, 2 cooks, 2 helpers, 2 dishwashers, and a butcher; 1.07 marks (about 26 cents) is allowed per ration and the diet is very liberal, the dinner for the day being clear soup, roast pork, noodles, green beans, roast potatoes, bread, and butter. It was well cooked and well served. Wine is furnished on most of the regular diet forms.

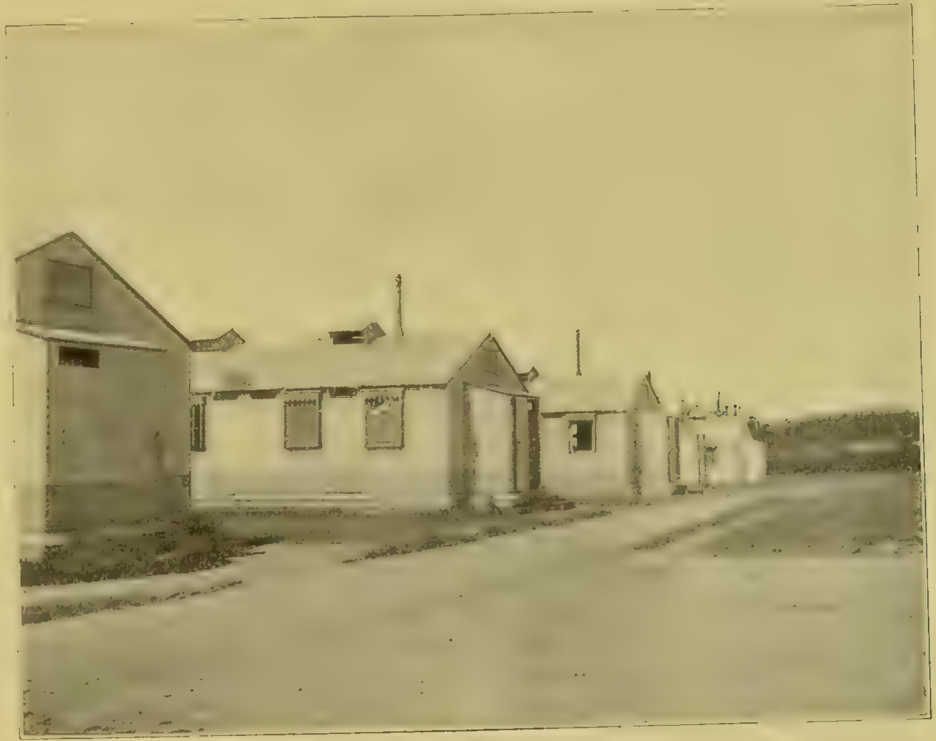
Field service.—The medical department of the German army exists for war and is ready for war. The field methods are, however, so radically different from our own that it is difficult to make just comparison. Canvas is little used, and when tentage is provided the troops sleep on it as often as under it. At the time of my visit there was a movement toward having all medical-department tentage of a special color, a grass green, and this appears an excellent idea for various reasons. Tent pegs are metal bound and tipped.



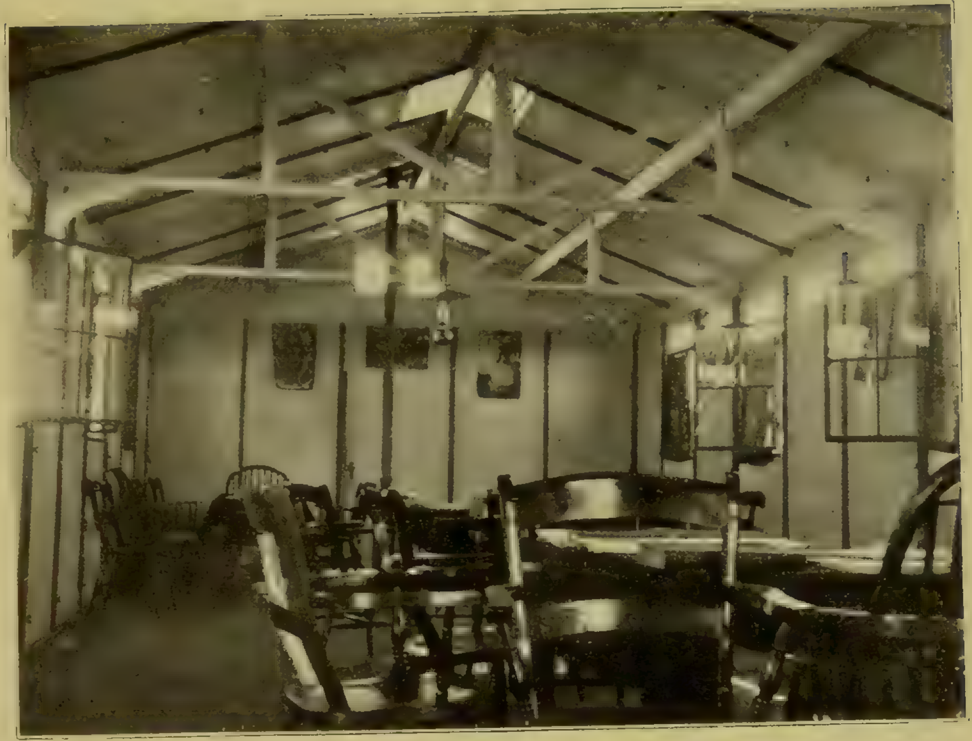
Field hospitals have already been mentioned, valuable features of which are mobility and divisibility. The usual size contains 200 beds, and this is separable into two of 100 beds each, and they can pack up and move as quickly as a regiment. Portable huts are much used for semi-permanent hospitals, and sufficient of these for two hundred beds can be erected or torn down in between four and five hours. A feature of the field work is the arrangement for carrying it on at night, signal rockets, torches, and lanterns being provided in large numbers. The amount of transportation furnished the medical department seems sufficient, and the draft animals are superior to our own. In time of war all private horses are seizable by the Government.

The annual maneuvers give medical officers valuable lessons in field administration, and the necessity of a knowledge of terrain by chief surgeons seems to be well understood. Map making and especially map reading are of as great service to our own as to other staff departments.

Conclusion.—Germany is not so much a country with a large army as a nation in arms. Where every man is a trained soldier the medical officer enters the army with a technical knowledge secondary in value only to his professional education. It is



PORTABLE HUTS USED IN THE GERMAN SERVICE. CAPACITY 18 BEDS.



INTERIOR OF A HUT USED AS A READING ROOM.

only by a union of the highest professional fitness with the ability to administer and command that a competent medical service is possible. In his earnest endeavor for improvement the German officer is second to none, the material equipment of his army is excellent, but in administrative methods we have little to learn from "The country in which all knowledge begins and ends."

In closing this report I desire to acknowledge my indebtedness to Lieut. Col. John B. Kerr, United States military attaché at Berlin, without whose intimate acquaintance with official methods and courteous assistance it would have been impossible to have gained the above information in the brief time at my disposal.

Report of Observations on the Organization and Service of the Medical Department of the French Army, made during the Month of June, 1901, by Capt. John S. Kulp, Assistant Surgeon, United States Army.

Organization.—The medical department (service de santé) is one of the five administrative departments of the French army, and is under the direction of its own officers, who are charged with carrying out of medical and hygienic measures, the command of the civil and military personnel permanently or temporarily attached to their service, and the administration and interior discipline of their corps. Unlike most foreign services, they are also charged with securing the material necessary to maintain and equip hospitals and sanitary organizations.

Personnel—Officers.—The officers of the corps are military surgeons, military pharmacists, and administrative officers.

Of the first class, there are:

Medical inspector-general, rank of major-general	1
Medical inspectors, rank of brigadier-general	11
Senior chief surgeons, rank of colonel	45
Junior chief surgeons, rank of lieutenant-colonel	60
Senior surgeons, rank of major	340
Junior surgeons, rank of captain	510
Senior assistant surgeons, rank of first lieutenant	406
Junior assistant surgeons, rank of second lieutenant	100
Total	1,473

Added to these there are:

Pharmaceutical inspector, rank of brigadier-general	1
Senior chief pharmacists, rank of colonel	4
Junior chief pharmacists, rank of lieutenant-colonel	5
Senior pharmacists, rank of major	30
Junior pharmacists, rank of captain	45
Senior assistant pharmacists, rank of first lieutenant	20
Junior assistant pharmacists, rank of second lieutenant	10
Total	115

The administrative service consists of:

Principal administrative officers, rank of major	18
Administrative officers of the first class, rank of captain	140
Administrative officers of the second class, rank of first lieutenant Administrative officers of the third class, rank of second lieutenant	192
Total	350

Variations from the rule of promotion according to seniority may be made because of acts of special devotion or courage, or when it is imperative that vacancies be filled, and in all cases the time served in war or in the colonies is doubled in computing the length of service. The retiring age varies according to the grade, thus, colonels retire at 60, lieutenant-colonels at 58, majors at 56, captains at 53, and lieutenants at 52.

The pay proper of officers is as follows:

Major-generals	$3,780	Majors	$1,101
Brigadier-generals	2,520	Captains	612–830
Colonels	1,627	First lieutenants	504–540
Lieutenant-colonels	1,317	Second lieutenants	468

Soldiers.—The enlisted men under the command of the medical department are divided into nurses, clerks, and workmen, and company litter bearers. Of these only the first class are directly under the personal command of medical officers, the second class is controlled by administrative officers (themselves under the command of medical officers), while the third, as a rule, are commanded by their own regimental superiors.

To each of the 25 army corps there is a section of military nurses, but the strength of this section depends upon the fiat of the minister for war, and varies greatly according to the time and the station. The composition of each section is as follows: Sergeant-major, sergeant-farrier, sergeant-clerk, sergeant instructor (in charge of property), corporal-farrier, corporal-clerk, and corporal instructor. The proportion of these noncommissioned officers is 1 sergeant and 2 corporals to each 13 privates. In addition there are 42 warrant officers, called adjutants, all of which are really under instruction. The privates are graded as clerks, workmen, tailors, shoemakers, buglers, and canteen stewards.

Company bearers are detailed in much the same way as was formerly done in our own service, but are divided into two classes, and their strength varies according to the peace or war footing of the army. On a war footing they constitute about 3 per cent of the force. The term of regular enlistment is five years, and the compulsory military service three.

Instructions.—The army medical school (Paris) is conducted on military principles, although for the purpose of giving assistant surgeons and pharmacists instruction in the theory and practice of the specialty of military medicine. For this purpose the Val-de-Grâce hospital is attached to it and placed under charge of the brigadier commanding the school (un medicin inspecteur), who reports directly to the minister for war. The school is governed by three boards of officers—of improvement, of administration, and of discipline. The course begins on the 1st of February of each year and continues for nine months, after which those student officers who have successfully passed the examination are commissioned junior assistant surgeons with rank of second lieutenants.

The school at Lyons is under the control of its own faculty, and has for its object (*a*) to make provision for obtaining sufficiency of army surgeons, (*b*) to supplement the studies of the candidates for the medical department of the army, (*c*) to give to these latter a certain amount of military training preparatory to their admission to the school of Paris. To meet the requirements of admission the candidate must be a French citizen between 17 and 23 years of age, must pay a yearly fee of a thousand francs, and must provide himself with his own outfit. In case of students "who prove a deficiency in the wealth of their family" half or whole scholarship may be granted by the minister for war. Especial emphasis is placed on the military character of the instruction, and students have their quarters and mess at the school.

There are schools for the study of military pharmacy at Bordeaux, Lille, Lyons, Montpellier, Nancy, Paris, and Toulouse, and pupils are allowed a choice among them. While under instruction they are attached to military hospitals, and placed under the command of medical officers.

The instruction of the enlisted personnel is military, technical, and professional in its nature, there being also special training for artificers. Men who are proficient in the care and management of steam apparatus, such as sterilizers, automobiles, laundry machines, and the like, receive the grade of corporal.

The military instruction extends over a period of six weeks under the personal command of an officer of the administrative service, who carries out the course prescribed by the medical officer. By an especial regulation the chief surgeon is directed to allow nothing to interfere with the course, and ordered to insure its continuance during succeeding hospital service (without regard to other duties) for at least two hours per week.

Following the period of military instruction, desirable men are selected for a "platoon for special instruction," which is designed to produce men who are trained nurses, clerks, officers' secretaries, and generally useful. Those possessing sufficient aptitude are made corporals, although in order to obtain promotion it is almost necessary that the men have had instruction at the school for mechanicians as well.

The "technical" instruction which follows is given only to graduates of the platoon of special instruction, and consists in a course of clerical work, hygiene, minor surgery, sterilization, baths, and bandaging. The training is both theoretical and practical and continues three months.

"Professional training" is given throughout the year to all the enlisted personnel on the general organization and the duties of the medical department with especial reference to field service, the care and transportation of sick and wounded, and the various duties required in hospital work. From this training there must be no absentees, and the orders on the subject enjoin that it be carried on "with great personal care and constant solicitude, not only with reference to immediate satisfactory results, but always with especial thought and preparation for service in war." As a further course in professional training, certain men receive more advanced teaching in massage, medical bathing, and the care of steam apparatus.

Considering the care and attention to detail with which every part of the training of the recruit is guarded, the men of the hospital service with whom I conversed did not seem to have reached a high standard of fitness.

Field service.—As laid down by the regulations, the duties of the medical department in the field are (*a*) the provision, preparation, and execution of hygienic measures intended to preserve the good condition and health of the troops. It is expected to (*b*) attend the sick and wounded on the march and upon the field of battle; (*c*) to see that the sick and wounded are methodically selected out, both for the purpose of preserving the effective strength as well as to prevent crowding of the field operations; (*d*) to be responsible for the treatment of the slightly disabled on the spot, and those who from the gravity of their cases can not be moved; (*e*) to secure the rapid evacuation toward the rear of all other sick and wounded; (*f*) to take measures to combat epidemics and to protect the country against their importation; (*g*) to initiate measures for extending hospital establishments at the base, and to create new institutions in order to meet with satisfaction all the necessities arising from a state of war; (*h*) to assume charge of sanitary affairs during sieges, and to provide troops with medicines, dressings, and surgical supplies.

Field service is divided into the service of the front and that of the rear. The service of the front comprises whatever affects the marching personnel, while that of the rear includes all sanitary formations, "which although a part of the army do not march with the troops." These sanitary formations of the rear are exempt from control of the general commanding at the front.

Service of the front.—The service of the front includes the regimental detachment which gives aid in station, on the march, and during battle, the ambulance or dressing station, and the field hospitals. These latter are designed to relieve the dressing stations of their wounded during the evening of the fight, or at latest the next morning. They treat on the battlefield if necessary and practicable such wounded as can not be removed, thus often reenforcing the dressing stations; the whole idea being a motile organization controlled by the medical department, which is held responsible for its efficiency. In carrying out this idea each field hospital is regarded as a part of a general whole, and can either coalesce with others to form one of larger proportions, or, on the other hand, can divide into separate halves, each capable of remaining independent for an indefinite period. In the normal order of march the field hospitals form a special train of their own, immediately behind that of the subsistence department. When, however, the field hospitals are distributed throughout the divisions, they march ahead of the regimental trains and behind their guard.

Service of the rear.—The service of the rear is carried out along two distinct lines, first, the care of the disabled along the line of communication, thus including such field hospitals as are mobilized within the rear zone and contain wounded who can not be further removed. This use of field hospitals is, however, strongly condemned, and is resorted to only in exceptional cases, such as sudden epidemics, or on the breaking down of auxiliary or permanent institutions.

Charitable organizations are a recognized branch of relief, but they are governed by regular laws promulgated by the General Government, are under the direct command of the Medical Department of the Army, and from current report are businesslike organizations devoid of hysterical manifestations. Their sphere of influence includes the whole service of the rear, but applies especially to the permanent institutions converted to military use.

All along the lines of communication are well-named "evacuation hospitals" made from railway stations, hotels, churches, or other buildings, and these are kept supplied from the base with material in excess of their needs, so that they may act as reserve depots. Whenever these hospitals are of a military character it is stipulated that they be made divisible, both as regards material and personnel. This personnel consists of regular, reserve, and volunteer medical officers, administrative officers, nurses, litter bearers, clergymen, teamsters, and various civilians. The evacuation hospital is understood to be a place for temporary treatment, and every effort is directed to keeping its beds ready to receive those from the front.

The second division of the service of the rear contains the hospitals and other institutions of the base, which in time of war are all under military control.

Transportation.—The following varieties of wheeled transportation are in use by the medical department:

Each regiment of infantry or of field artillery is provided with a 2-wheeled cart, which has a wheel brake, a lantern, and weighs about 300 pounds. This cart contains materials for 300 dressings, including half a dozen regimental panniers, a

10-liter canister, a 30-liter cask, a set of blanks, red and white lanterns, Red Cross and national flags, and certain other articles on racks depending on the arm of the service. These carts, although designed for a single animal, can be readily drawn by men and are designed for service at the real front. . Two recumbent patients can be crowded into one of them.

The 4-wheeled regimental wagon (not ambulance) is a strong, heavy vehicle, the front wheels of which are cut under, and which has a lamp and wheel brake on the right side, a canvas cover, and sufficient length of bed to carry 2 reclining patients in an emergency. It carries much the same supply as the cart, but in larger quantity.

The wagon for non-mounted personnel is a large covered 4-wheeled omnibus, having 4 windows in the sides, a high driver's seat in front, and padded seats within for 8 officers. This wagon, by means of which 2 horses transport 8 persons and their baggage, is distinctly of value.

The surgical wagon is intended to be drawn by 4 horses, has wooden sides and top, and weighs loaded 1,850 kilograms, of which 810 constitute the load. It has doors at the sides and rear, and carries an admirably arranged assortment of dressings, surgical instruments, medicines, and supplies. Every part of this material is readily accessible.

The administration wagon is also a 4-horse vehicle, with wooden sides and top, weighing 1,100 kilograms. As in all the wagons of this class, it is divided in two parts, and carries a complete office equipment, including records, blanks, and stationery. In the rear, but completely separated by a partition, are the mess supplies, kitchen furniture, water and wine tanks for a variable number of men.

The reserve baggage wagon of the medical department (fourgon de service de santé) is a well-made, strong, 4-wheeled vehicle, with wheel brake and lanterns, canvas covered on a wooden frame, high wooden sides, 3 steps at the rear, and platform springs. It can be used to carry sick in an emergency. Six of these wagons constitute a set, and are lettered, according to their contents, from A to F. Briefly, wagon A contains dressings, splints, 15 blankets, and a 50-liter cask. This carrying of receptacles for sterilized water or wine is considered of prime importance. Wagon B contains fracture pads, shirts, prepared lint, medicine in cases, ax, pick, spade, and crow. Practically everything is packed in panniers in all the wagons. Wagons C and D are attached to the headquarters of each corps, while each division has wagons A and B. C and D have identical contents, the idea being that either can be sent without delay to that part of the corps needing them most, and they contain complete operation, medical, and surgical supplies for 2 field hospitals, lanterns, flags, nose bags, casks, buckets, and material for the repair of harness. Wagon E carries the same supplies as F, namely, a hospital tent (20–13–8), 25 litters, buckets, 30 liters of brandy, and 50 liters of wine. In addition it carries officers' mess chests and a limited amount of their baggage.

Besides the above there are army wagons (fourgons ordinaires) used for carrying rations and other regular impedimenta. They do not seem as well made as our own escort wagon and are of about the same capacity. The steam sterilizer (system of Geneste and Herscher) is too heavy for transportation on American roads by less than 6 animals.

Of ambulances proper there are two principal models, the 2-wheeled carrying 2 recumbent patients and the 4-wheeled carrying 4. The former is light enough to be easily drawn by a single animal, and can go almost anywhere. The latter is not so good an ambulance as is our own as modified by Munson. I am informed that wounded are often preferably transported in the high French hay-wagon, which will take as many as 10 litters.

The wagon train when practicable is drawn by an automobile at a rate of between 3 and 4 miles an hour. This they find cheaper and more convenient than horses, and it is believed to be practicable for our own roads as well. The train of the medical department is a separate command—a divisible unit—under medical and administrative officers who have been trained for this line of work. The transportation for an army corps consists of the following, so far as the medical department is concerned:

Allowance of transportation for medical department of a corps.—With the headquarters of the corps: One wagon for personnel, 2 surgical wagons, 2 administrative wagons, 2 set reserve baggage wagons (A to F), 2 food wagons, 8 two-wheeled ambulances, and 6 four-wheeled ambulances.

To each of the divisions of infantry there are allowed the same, except that there are but 4 each of both two and four wheeled ambulances.

For the cavalry regiment of four squadrons: Two reserve baggage wagons, A and B, 3 two-wheeled ambulances, and 3 four-wheeled ambulances.

For each of the 8 field hospitals: Four reserve baggage wagons, A, B, C, and D.

For the hospital evacuation: Two complete field hospitals, 4 wagons containing 6,400 dressings, 3 improved sanitary trains, and 1 wagon for medical necessities.

Relative position of medical department in line of march.—The order of march of an army corps, if in a single column, is as follows:

Head of advance guard:
Cavalry.
Battalion of infantry.
Detachment of pioneers.
Body of advance guard (3½ miles long):
Headquarters first division.
Headquarters first brigade.
Two battalions of infantry.
Two batteries artillery.
Two regiments of infantry.
Medical service of the first brigade.
Camp equipment.
(One and one-half miles interval.)
Body of the column:
Corps headquarters.
Headquarters second brigade.
Battalion infantry.
Three batteries artillery. Covering a space of about 7¾ miles.
Third and fourth regiments.
Medical service of the second brigade.
Engineer detachment.
Batteries of artillery in three groups (9⅜ miles).
Headquarters second division.
Engineers.
Headquarters third brigade.
Fifth and sixth regiments.
Six batteries.
Headquarters fourth brigade. Occupying a space of about 14½ miles.
Seventh regiment.
One battalion of infantry.
Medical service of the second division.
Ammunition train in 9 sections.
Rear guard:
Four companies of infantry.
Cavalry.
Wagon trains and their guards:
    Medical service of the corps.
    Three field hospitals.
    Regimental wagon trains.
    Two companies of infantry.
    Administrative convoy.
    Five field hospitals.
    Extra wagons and horses.

The above distances as given in Service de Santé de l'Armée en Campagne, page 143, are believed to be largely theoretical, and the time allowance of 3⅛ miles an hour is assuredly so. The order of march of the medical department of a corps is as follows, and this column is said to be 600 yards in length:

Chief medical officer.
Chief of the first section.
Administrative officer in command of hospital corps.
Religious ministers.
Hospital corps (nurses), in two detachments.
Hospital corps (litter bearers) in two platoons.
Officers commanding train.
Veterinary surgeon.
Bugler and noncommissioned officers.
Wagon for unmounted officers.
Mules for litters and cacolets.
Four two-wheeled ambulances.
Three four-wheeled ambulances.
Surgical wagon.
Administrative wagon.
Three medical department wagons.

Commissary wagon.
Workmen on foot.
Thirty-five feet interval.
Medical officer.
Administrative officer.
Third and fourth detachments of hospital corps (nurses).
Third and fourth platoons of litter bearers.
Officer commanding train.
Bugler and noncommissioned officers.
Mules for cacolets and litters.
Four two-wheeled ambulances.
Three four-wheeled ambulances.
Surgical wagon.
Administrative wagon.
Three medical department baggage wagons.
Commissary wagon.
Unmounted personnel of the train.

In the French service everything pertaining to the subject of transportation is laid down in such an exact manner that in time of war it would seem that there would be little else to do than to carry out orders. For instance, on the subject of dressings and litters, the allowance transported by each military unit is definite, the total for a mobilized army corps being 18,870 dressings and 272 litters. The care and thoroughness of their regulations is admirable in its attention to details. Thus the maxima and minima loads are always noted, the speed of the wagon train is calculated, and each part of a load is either numbered or else there is notation on the floor or side of the vehicle to show its place. In the case of long trains each wagon bears its individual number, so that it has a definite place, and the change from animals to automobiles is made by simply slinging the pole of the wagon beneath them, and coupling them together. The driver retains his place in order to apply the brake and guide the vehicle.

Hospitals.—Hospitals vary in size from Val-de-Grâce, with its 1,137 beds, to that of Mont Louis, with but 27. The colonial hospitals, judging from their printed reports, are not only very large (those of 500 beds being rather numerous), but are very economically administered. The general classification is the same throughout the Republic, the classes being: Hors classe, as Val-de-Grâce and a few others mainly devoted to special work or to special classes of patients, and first, second, third, fourth, fifth, and sixth classes, according to their importance and financial allowances. The number of beds now varies widely in hospitals of the same class, but is approximately 80 beds for the sixth class and an increase of about 80 for each class above it. The allowance of personnel is also interesting; the various divisions of the men being medical officers, administrative officers, pharmacists, clerks, janitors, cooks, dispensers, property men, bath men, clergy, surgical orderlies, sergeant supervisor, canteen sergeant, outside orderlies, administrative officers' orderlies, gardeners, barbers, painters and whitewashers, clothing men, soldiers in charge of fuel and of lights, mattress makers, carpenters, locksmiths, plumbers, shoemakers, tailors, firemen, printers, waiters, and ward men. The noncommissioned officers are sergeant-major. sergeant, and corporal. With the exception of the noncommissioned officers, the above constitutes the permanent personnel of the hospital, the allowance of which (independently of the number of patients) is as follows: Val-de-Grâce, 77; first class, 53; second class, 45; third class, 35; fourth class, 29; fifth class, 22, and sixth class, 20.

Added to this is the variable personnel, which depends on the number of patients in the wards, and is:

For each ward	privates	3
For each 3 officers treated	private	1
For each 5 noncommissioned officers	do	1
For each 8 soldiers	do	1
For each medical or administrative officer on duty	do	1
For each ward	noncommissioned officer	1

To this number is then added 10 per cent to allow for men of the hospital corps who are on leave or sick and for the special care of the field outfit attached to every hospital.

The allowance of medical and administrative officers varies greatly, and there is a tendency to have a permanent and variable one here also. It is said that there is less rotation in station in our own service.

In regard to the actual work of the hospitals, the time at my disposal was too limited to give sufficient data on which to generalize. It chanced that the Val-de-

Grâce was visited on the day of their annual inspection, but the police of the building was not all that one would expect. The hospital corps seemed to me undersized and not well set up, but the commissioned officers presented a clean-cut, soldierly appearance decidedly above the average. Here, as elsewhere in Europe, mounted officers wear their spurs whenever on duty.

Conclusion.—Modern methods of warfare affect the medical department no less than the line and in various directions. The placing of a weapon in the hands of an infantryman which is effective to the limit of his vision has deepened the service of the front to such an extent that problems of first aid and transportation are more difficult than ever. The modern long thin line, without support, and with reserves only at great distance must necessarily expose the one staff department always under fire and demands extra personnel to provide for losses and to cover the increased space. The white brassard under certain conditions becomes a death warrant, for the soldier of to-day is not only the hunter but is also the game, and the uniform of the sanitary soldier must not differ conspicuously from that of those around him. The French medical department seems thoroughly alive to these changed conditions and is devoting thought and labor to the most important but almost undeveloped subject of the sanitary service of the zone of fire. With this end in view they lay particular stress on (*a*) military discipline, (*b*) a medical department trained in administrative work, (*c*) a soldierly personnel which can be relied on under fire, and (*d*) carefully thought-out provision for the transportation of men and supplies, designed to meet the exigencies of actual war.

CONCLUSION.

In concluding this, my last report as Surgeon-General of the Army, I desire to call attention briefly to some of the more important facts relating to the history of the Medical Department during the period of my service in this capacity. It has been my constant aim to maintain a high standard of professional attainment among the medical officers of the Army. With this end in view they have been liberally supplied with professional books and periodicals, and, so far as practicable, the younger members of the corps have been given stations where they would have opportunities for improving themselves professionally, and at the same time have been made to understand that the examinations required by law to be made in advance of their promotion to the grade of captain and major would be so rigid as to require their best efforts to keep *au courant* with the advancement of medical knowledge and its practical application. In order that medical officers who were approaching the time when they would be required to pass an examination for promotion to a majority might have an opportunity to prepare themselves for this examination, upon my recommendation the following regulation, which now constitutes paragraph 12 of the Manual for the Medical Department, edition of 1900, was approved by the honorable the Secretary of War in 1893:

> The Surgeon-General will recommend the assignment as attending surgeons in the principal medical centers of the United States of medical officers who have not yet passed their examinations for promotion to a majority and, so far as may be practicable, in the order of their seniority. These details will be made for one year only, in order that as many medical officers as possible may be enabled to avail themselves of the opportunities thus offered for making themselves familiar with the practice of the leading physicians and surgeons in this country and of attending medical lectures, meetings of medical societies, etc. At the end of this tour of duty medical officers are required to make a detailed report to the Surgeon-General, showing how much of their time has been occupied by their official duties and to what extent they have availed themselves of the advantages offered for professional advancement.

For the instruction of medical officers recently appointed, the Army Medical School was established in this city June 24, 1893.

> The course of instruction covers a period of five months, and is given annually at the Army Medical Museum in Washington, D. C., commencing on the first Monday

of November. It includes lectures on and practical instruction in (*a*) the duties of medical officers in war and peace. (*b*) Military surgery, the care of the wounded in time of war, and hospital administration. (*c*) Military hygiene. (*d*) Military medicine. (*e*) Microscopy, sanitary and clinical; pathological histology, bacteriology, and urinology. (*f*) Hospital Corps drill, and first aid to wounded.

Realizing that the best surgical work could not be expected from our medical officers unless they were supplied with the most modern and approved instruments and appliances, I have endeavored to make our equipment for surgical work, in hospitals or in the field, as complete as could be desired. I have insisted upon every hospital of any size being provided with a suitable operating room, furnished with all the appliances required for aseptic surgical work, and with a laboratory fitted up for such bacteriological, pathological, and chemical investigations as might be required in connection with clinical work, and also for carrying on original investigations for the advancement of medical science. As a result of this policy we have a considerable number of medical officers in the corps who are well fitted for undertaking original research work, and during the past two years results of the highest value have been attained by the boards, appointed upon my recommendation, for the study of tropical diseases in Cuba and in the Philippines. (See p. 176 and p. 202.) All of the members of these boards have given evidence of zeal and ability in the prosecution of the work assigned to them. The board in Cuba, of which Major Reed, surgeon, United States Army, is president, has attained results of the greatest value, and Major Reed is worthy of special commendation for the scientific acumen he has displayed in planning and carrying out the experiments which have led to the demonstration that yellow fever is transmitted from man to man by mosquitoes.

Dr. James Carroll, contract surgeon, United States Army, a member of this board, has also distinguished himself by his intelligent and self-sacrificing devotion to the investigation with which the board was charged. He first submitted himself to mosquito inoculation, and as a result suffered a severe attack of yellow fever. The credit due him is no less than that which has been universally awarded to his less fortunate colleague, Dr. Jesse W. Lazear, who died as a result of a similar inoculation.

First Lieut. Richard P. Strong, assistant surgeon, United States Army, and First Lieut. William J. Calvert, assistant surgeon, United States Army, members of the board for the study of tropical diseases in the Philippines, have made valuable contributions to our knowledge of these diseases, and especially of tropical dysentery and bubonic plague.

The selection resulting from a rigid entrance examination, together with the facilities afforded medical officers for maintaining a high standard of professional attainments, has given to the Army a medical corps of which it may well be proud, and, as a matter of fact, I believe that with few exceptions our medical officers enjoy the respect and esteem of their fellow-officers of the line, with whom they are most intimately associated and whose hardships and dangers they are called upon to share. In this, my final report, I desire to express my high appreciation of the services which have been rendered by the medical officers of the Army, of all grades, during and since the Spanish-American war, under conditions which have taxed to the utmost their physical and mental powers of endurance. The value of previous training and experience in the military service has been amply demonstrated, and it must be apparent to all who are familiar with facts that trained medical officers are as essential to the well-being of an Army as trained soldiers, and that a practitioner of medicine or surgery, however well informed, has much to learn before he is fitted to assume the duties of a medical officer, especially in time of war.

Since my appointment new and modern hospitals have been built at the following-named posts: Washington Barracks, D. C., Fort McHenry, Md., Fort Myer, Va., Fort Wadsworth, N. Y., Fort Monroe, Va., Fort Hamilton, N. Y., Fort Hancock, N. J., Fort Snelling, Minn., Fort Slocum, N. Y., Fort Adams, R. I., Madison Barracks, N. Y., Fort Terry, N. Y., Fort Preble, Me., Fort Leavenworth, Kans., Fort Williams, Me., Fort Ontario, N. Y., Fort Washington, Md., Fort Keogh, Mont., Fort Robinson, Nebr., Fort Ethan Allen, Vt., Fort Crook, Nebr., Fort Meade, S. Dak., Plattsburg Barracks, N. Y., Fort Wright, Wash., Fort Baker, Cal., Fort H. G. Wright, N. Y., Fort Strong, Mass., and Great Diamond Island, Maine. These are brick buildings of an approved plan, and for the most part are heated by hot water. All are provided with operating rooms and laboratories.

The Army and Navy Hospital at Hot Springs has been greatly enlarged and improved, and upon my recommendation, approved by the President, discharged volunteer soldiers are now admitted for treatment. The commanding officer, Maj. George H. Torney, surgeon United States Army, deserves great credit for the energy and ability he has displayed in the management of this hospital.

The post hospital at Washington Barracks was made a general hospital, at my request, in September, 1898. It has recently been enlarged and now has a capacity of 50 beds. Many serious surgical cases have been successfully treated in this hospital, and it has proved most useful not only for the care of the sick and wounded, but also for the instruction of young medical officers attending the Army Medical School. Major W. C. Borden, the commanding officer, deserves great credit for his able administration of the affairs of the hospital and for the successful results attained in the treatment of a large number of serious surgical cases. Maj. H. O. Perley, surgeon, United States Army, has rendered most efficient services as commanding officer of the Army hospital ship *Relief*, which, under his able management, has proved to be of the greatest utility and has justly been considered a model hospital ship.

During the Spanish-American war, general hospitals were established at Fort Myer, Va., Fort Thomas, Ky., Fort McPherson, Ga., Key West, Fla., Fort Monroe, Va., Savannah, Ga., Chickamauga Park, Tenn., and at the Presidio, San Francisco, Cal. After the muster out of our Volunteer Army we were able to dispense with all of these general hospitals with the exception of that at the Presidio. This hospital, under the able management of Lieutenant-Colonel A. C. Girard, deputy surgeon-general, has served a most useful purpose in caring for our sick and wounded soldiers returning from the Philippines. I consider the Presidio General Hospital a model military hospital, and invite special attention to the interesting reports of Lieutenant-Colonel Girard, published in this volume (pp. 78 to 125 and 288 to 297), which give a full account of the medical and surgical work accomplished during the fiscal year ending June 30, 1901.

An account of our hospital for the treatment of cases of tuberculosis will be found on page 13. This hospital was established in 1899, and has proved to be of inestimable value for the treatment of the victims of pulmonary tuberculosis, and also enables us to remove these cases promptly from the wards of general and post hospitals, thus greatly reducing the chances of the propagation of the disease among our soldiers. Maj. Daniel M. Appel, surgeon, United States Army, has been indefatigable in his efforts to make this a model sanitarium and in his attention to the interests of the sick under his care.

I also invite attention to that portion of this report which relates to the operation for the radical cure of hernia (pp. 244 to 250). The policy of operating upon soldiers for the radical cure of hernia, and thus retaining their services in the ranks instead of discharging them, to become pensioners, has been attended with most favorable results. It has also given army surgeons an opportunity to demonstrate their skill in the performance of a difficult operation and to show that the results of their surgical work compare favorably with the best results obtained by the leading surgeons in civil life. The same is true as regards operations for appendicitis and emergency surgery generally.

The appropriation for the Medical Department prior to the Spanish-American war varied from $170,000 in 1893 to $140,000 in 1897. With these small appropriations it was impracticable to accumulate a reserve supply for any sudden emergency which might arise, and after the declaration of war in 1898, so soon as funds were available, it became necessary to purchase the field equipment required by our Volunteer Army of 250,000 men. The manufacture of medical chests and of the various articles pertaining to the field equipment of a regiment required time, and in spite of every effort to expedite the manufacture and delivery of these necessary articles many regiments were obliged to wait for some weeks before they received their full field equipment. This was the cause of much dissatisfaction and unfavorable criticism of the Department, but under the circumstances was entirely unavoidable. Constant efforts have been made to perfect our field equipment, and I am informed by medical officers attached to our forces in China during the recent military operations in that country that it was generally recognized as being superior to that of any other nation. At present our enlarged supply depots are filled with medical supplies of all kinds, and it is the policy of the Department to keep on hand at all times a field outfit sufficient for the immediate supply of at least 100,000 men in addition to those now in service. Before the Spanish-American war my most reasonable estimates for the Medical Department were frequently reduced by Congress, and barely enough money was appropriated to meet current expenses. But since that time appropriations have been liberal, as will be seen by the following figures: 1897, $140,500; 1898, $135,200; 1899, $2,765,000; 1900, $1,500,000; 1901, $2,000,000.

While the officers of the Medical Department, the volunteer medical officers, and contract surgeons in the service have as a rule rendered faithful and satisfactory services, I consider it my duty to call special attention to the services of a few of those who have occupied positions of the greatest responsibility.

Col. Chas. R. Greenleaf, assistant surgeon-general, chief surgeon Division of the Philippines, has administered the affairs pertaining to the medical department in that division with conspicuous ability. Col. Wm. H. Forwood, assistant surgeon-general, chief surgeon Department of California, has occupied a position only second in importance to that of the chief surgeon in the Philippine Islands, as all troops going to or returning from these islands are detained for a greater or less length of time in San Francisco, and a large number of sick soldiers are brought to that city by returning transports. He has been most faithful and zealous in the performance of his responsible duties, and has given evidence of excellent executive ability, not only as chief surgeon of an important department, but as acting Surgeon-General of the Army during my absence on an inspecting trip in the Philippines.

Col. Justus M. Brown, assistant surgeon-general, has performed the duties of medical supply officer in New York City, during and since the Spanish-American war, in a most creditable and satisfactory manner. Col. Charles Smart, assistant surgeon-general, in charge of the sanitary division of my office, has, as usual, performed the important duties devolving upon him with untiring zeal and distinguished ability. Col. Calvin De Witt, assistant surgeon-general, in charge of the museum and library division of my office and president of the army medical examining board in this city, has performed all of the duties pertaining to these responsible positions in a most satisfactory manner. Maj. Valery Havard, chief surgeon, Department of Cuba, has administered the affairs of the Medical Department in that island in a most intelligent and creditable manner. Maj. John Van R. Hoff, surgeon, United States Army, having made an excellent record as chief surgeon in Porto Rico, was selected by me as chief surgeon of the China relief expedition, but upon his arrival in China hostilities were over, and at my request he was ordered to this city for duty in my office. He was placed in charge of the Hospital Corps division and of the supply depot at the Army Medical Museum and has performed all of the duties devolving upon him with zeal and ability. Maj. William B. Banister, surgeon, United States Army, accompanied the troops from Manila to China and acted as chief surgeon of the expedition until the arrival of Maj. Francis J. Ives, surgeon, United States Army, on September 25, 1900, who continued to act as chief surgeon until the withdrawal of all of our troops with the exception of a legation guard. These medical officers distinguished themselves by their efficient management of the affairs of the Medical Department during the expedition to China and the occupation of Pekin.

Mrs. Dita H. Kinney was appointed superintendent of the female nurse corps in March, 1901. She has given evidence of an intelligent appreciation of the interests of the female nurse corps and of the service, of excellent judgment and of administrative ability.

I desire also to testify to the excellent services rendered, not only during the past year, but for many years, by some of the senior clerks in my office. The following named are worthy of special commendation on account of their zealous and efficient performance of the duties assigned them: Mr. George A. Jones, chief clerk; Mr. Joseph R. Rose, assistant to chief clerk; Mr. T. A. Haviland, in charge of records; Mr. B. F. Williams, in charge of correspondence; Mr. B. B. Thompson, in charge of accounts; Mr. D. G. Dixon, chief clerk supply division; Mr. A. M. Buck, chief clerk sanitary and disbursing division; Mr. W. H. Degges, in charge of statistical section; Mr. R. Ravenburg, chief clerk hospital corps division; Mr. C. J. Myers and Mr. F. W. Stone, of the museum and library division. Mr. Frank Coburn, who has been my personal stenographer and typewriter during the entire period of my incumbency of the office of Surgeon-General, has performed his responsible duties in a most satisfactory manner, and I desire to testify as to my appreciation of his efficient and faithful services.

In conclusion, I desire to ask for the medical corps of the Army the kindly interest of the Congress of the United States, of the honorable the Secretary of War, and of all general officers of the Army. History has amply demonstrated the fact that infectious diseases are often more fatal to the success of armies than the military operations of the enemy. Modern sanitary science justly claims that infectious diseases, such as smallpox, typhoid fever, yellow fever, cholera, bubonic plague, etc., are to a large extent preventable diseases. Special attention is given in the examination of candidates for the medical corps and in their subsequent training at the Army Medical School to questions relating to the cause and prevention of infectious diseases and to hygiene in general, and they are constantly made to feel their responsibility as guardians of the health of the commands to which they are attached. Evidently the prevention of disease among our soldiers is of paramount importance, and the medical corps can point with pride to the great reduction in the mortality and nonefficiency rates among our troops during the period from 1866 to 1897. Unfortunately, this record was broken during the Spanish-American war by the epidemic prevalence of typhoid fever in nearly all of our camps within the limits of the United States. The causes for this discreditable state of affairs are set forth in my paper entitled "Sanitary lessons of the war" (published in 1899), from which I beg leave to quote the following passages:

> The medical officers of regiments were appointed by the governors of States and, as a rule, were competent professionally, but they were called upon to assume new responsibilities for which they had no special training. Unfortunately, hygiene and practical sanitation are subjects which receive little attention in our medical schools or from physicians and surgeons engaged in the practice of medicine. But even in those cases in which the regimental surgeon was fully aware of the importance of camp sanitation and urgent in his sanitary recommendations he was unable to control the sanitary situation unless the regimental and company officers enforced the necessary measures for protecting the health of the command. And just here is the fundamental difficulty when we are dealing with new levies of troops. The officers and enlisted men of our volunteer regiments were, as a rule, intelligent, patriotic, and brave, but they were not disciplined. Each man was in the habit of judging for himself and of acting in accordance with his individual judgment. Discipline consists essentially in an unquestioning obedience of orders from those having proper authority to give them. Trained officers can not at once establish discipline among untrained troops, and when both officers and enlisted men are without military experience it is evident that, with the best material, time will be required for the establishment of discipline, and in the absence of discipline it is impracticable to enforce proper sanitary regulations in camp. The Surgeon-General may formulate sanitary regulations and the general commanding an army corps or a division may issue the necessary orders, but in the absence of discipline these orders will not be enforced. A reckless recruit will drink the water which has been condemned as unsafe and at night will defile the ground in the vicinity of his tent rather than visit the company sink, which, possibly, is in a disgusting and unsanitary condition because of a failure to carry out the orders to cover the surface of excreta "with fresh earth or quicklime or ashes three times a day."
>
> New levies of troops are especially subject to typhoid fever and other infectious camp diseases, not only because of a lack of discipline and consequent difficulty in the enforcement of necessary sanitary regulations, but also because the individual soldiers are very susceptible to infection, owing to their age, the abrupt change in their mode of life, the exposure and fatigue incident to camp life, and last, but not least, their own imprudence as regards eating, drinking, exercise, etc.
>
> The value of experience and special training is recognized in all departments of human activity, and the military calling furnishes no exception to the general rule. This applies to the staff as well as to the line, and the medical staff is no exception. When, therefore, I say that the evils resulting from neglect of camp sanitation during the earlier months of the war were to some extent due to the inexperience of the regimental surgeons, I am not reflecting upon the professional qualifications of these gentlemen, but am simply stating a fact.

There has been no failure upon the part of the medical department of the volunteer army to accomplish all that could have been reasonably expected of it, but without doubt an adequate number of thoroughly trained medical officers could have done much at the outset of the war in the way of preventing the introduction and extension of typhoid fever in our camps, and in organizing and administering field hospitals, ambulance companies, etc.

Finally, the principal lessons to be derived from our recent experience may be stated as follows:

A trained medical corps, hardly adequate for an army of 25,000 men, can not control the sanitary situation when this army is quickly expanded to 250,000. Physicians and surgeons from civil life, however well qualified professionally, as a rule are not prepared to assume the responsibilities of medical officers charged with administrative duties and the sanitary supervision of camps. The proper performance of such duties can not be expected from a physician without military training or experience, no matter how distinguished a position he may have held in civil life.

Courage and patriotism on the part of line officers and enlisted men can not take the place of knowledge and experience; new levies of troops are, as a rule, ignorant of the first principles of camp sanitation and reckless as to the consequences of their neglect of prescribed sanitary regulations. Therefore training and discipline are essential factors in the preservation of the health of soldiers in garrison or in the field.

The value of the aphorism "In time of peace prepare for war" has received additional support. This preparation should include a corps of trained medical officers larger than is absolutely necessary for the Army on a peace basis, and systematic instruction in military medicine and hygiene for the medical officers of the National Guard as well as for those of the Regular Army; also instruction of line officers in the elements of hygiene and especially in camp sanitation. It should also include the establishment of camping grounds in various parts of the country, having an ample supply of pure water, a proper system of sewers, etc. If our volunteers could have been assembled in such camps during the late war a saving in lives and money would have resulted which would without doubt have demonstrated the economy of such preparation for war in time of peace.

With reference to the subsequent sanitary history of our troops, I again point with pride to the reports in the present volume relating to health conditions in the United States, and especially in our island possessions. I believe that new levies of troops serving in a tropical country have never, in the history of the world, had so good a health record as that shown by these reports for the troops stationed in the Philippine Islands, in Cuba, and in Porto Rico. My recent inspecting trip to the Philippine Islands has convinced me that when proper sanitary regulations are enforced the health of troops stationed in these islands will be quite as good as if they were stationed in our own "Gulf States." I would say further, with reference to this trip, that I found wherever I went well-equipped hospitals, ample and efficient medical attendance, and an abundance of medical supplies of all kinds.

STATISTICAL TABLES.

The following statistical tables give in detail the data on which the statements of this report are based. They are:

I. Numerical view of the effects of disease and injury on the Army during the calendar year 1900, as compared with the corresponding data for 1899 and for the decade 1889–1898.

II. Numerical view of the effects of disease and injury on the United States forces doing insular and home service in 1900, as compared with corresponding data for 1899.

III. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1889–1898.

IV. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered. (All the volunteer troops in service during the year were on duty in the Division of the Philippines.)

V. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service.

INTERNATIONAL TABLES.

I. Examination of recruits during the year 1900.

III. Movements of sick by branches of military service and by months, Volunteers and Regulars, 1900.

VI. Admissions of important diseases by branches of the military service, Volunteers and Regulars, 1900.

VII. Admissions of important diseases by months, absolute numbers, Volunteers and Regulars, 1900.

It has not been practicable during the past year to gather the data necessary for the presentation of Tables II, IV, V, and VIII of the international series.

TABLE I.—*Numerical view of the effects of disease and injury on the Army during the calendar year 1900, as compared with the corresponding data for 1899 and for the decade 1889–1898.*

	United States Army.					
	Volunteers.	Regulars.	Total.	White.	Colored.	Indian.
Mean strength	31,434	68,955	100,389	92,374	8,015	....
Total admissions to sick report	92,102	139,978	232,080	217,319	14,761	....
Per 1,000 of mean strength	2,930.01	2,029.99	2,311.81	2,352.60	1,841.67	....
Per 1,000 for previous year	1,522.33	2,342.26	2,178.06	2,175.47	2,214.88	....
Per 1,000 for preceding decade	....	1,280.19	1,280.19	1,280.37	1,293.60	1,115.42
Admissions for disease	86,814	125,563	212,377	199,340	13,037	....
Per 1,000 of mean strength	2,761.79	1,820.94	2,115.54	2,157.97	1,626.57	....
Per 1,000 for previous year	1,407.28	2,125.74	1,985.58	1,986.51	1,972.08	....
Per 1,000 for preceding decade	....	1,047.44	1,047.44	1,050.52	1,033.74	832.16
Admissions for injury	5,288	14,415	19,703	17,979	1,724	....
Per 1,000 of mean strength	168.23	209.05	196.27	194.63	215.10	....
Per 1,000 for previous year	115.05	216.52	192.48	188.95	242.80	....
Per 1,000 for preceding decade	....	232.75	232.75	229.85	259.86	283.28
Discharges for disability, all causes	408	1,861	2,269	2,133	136	....
Per 1,000 of mean strength	12.98	26.99	22.60	23.09	16.97	....
Per 1,000 for previous year	12.70	27.42	21.98	21.98	21.99	....
Per 1,000 for preceding decade	....	14.79	14.79	14.74	14.43	24.21
Discharges for disease	321	1,457	1,778	1,670	108	....
Per 1,000 of mean strength	10.21	21.13	17.71	18.08	13.47	....
Per 1,000 for previous year	10.45	21.65	17.51	17.50	17.65	....
Per 1,000 for preceding decade	....	11.68	11.68	11.62	11.47	21.57
Discharges for injury	87	404	491	463	28	....
Per 1,000 of mean strength	2.77	5.86	4.89	5.01	3.49	....
Per 1,000 for previous year	2.25	5.77	4.47	4.48	4.34	....
Per 1,000 for preceding decade	....	3.10	3.10	3.12	2.96	2.64
Deaths from all causes	1,138	1,145	2,283	2,105	178	....
Per 1,000 of mean strength	36.20	16.61	22.74	22.79	22.21	....
Per 1,000 for previous year	7.26	18.65	18.43	18.55	16.64	....
Per 1,000 for preceding decade	....	9.83	9.83	9.68	10.77	16.72
Deaths from disease	784	801	1,585	1,465	120	....
Per 1,000 of mean strength	24.94	11.62	15.79	15.86	14.97	....
Per 1,000 for previous year	6.32	12.75	11.76	11.85	10.42	....
Per 1,000 for preceding decade	....	7.08	7.08	7.01	7.65	9.68
Deaths from injury	354	344	698	640	58	....
Per 1,000 of mean strength	11.26	4.99	6.95	6.93	7.24	....
Per 1,000 for previous year	.94	5.90	6.67	6.70	6.22	....
Per 1,000 for preceding decade	....	2.74	2.74	2.67	3.12	7.04

TABLE II.—*Numerical view of the effects of disease and injury on the United States forces doing insular and home service in 1900, as compared with corresponding data for 1899.*

	Cuba.	Porto Rico.	Pacific islands.			China.	Total islands and China.			United States (continental).
			Volunteers.	Regulars.	Total.		Volunteers.	Regulars.	Total.	
Mean strength	8,690	2,180	31,434	35,448	66,882	1,947	31,434	48,265	79,699	20,690
Total admissions to sick report	16,277	3,440	92,102	83,260	175,362	5,739	92,102	108,716	200,818	31,262
Per 1,000 of mean strength	1,873.07	1,577.98	2,930.01	2,348.79	2,621.96	2,947.61	2,930.01	2,252.49	2,519.70	1,510.97
Per 1,000 for previous year	2,749.74	2,522.40	2,065.65	2,630.92	2,395.52	....	2,180.87	2,732.99	2,515.65	1,677.51
Admissions for disease	13,784	3,047	86,814	77,905	164,719	5,112	86,814	99,848	186,662	25,715
Per 1,000 of mean strength	1,586.19	1,397.71	2,761.79	2197.73	2,462.83	2,625.58	2,761.79	2,068.75	2,342.09	1,242.87
Per 1.000 for previous year	2,537.98	2,255.97	1,859.21	2,454.10	2,206.36	....	1,999.57	2,519.33	2,314.74	1,496.84
Admissions for injury	2,493	393	5,288	5,355	10,643	627	5,288	8,868	14,156	5,547
Per 1,000 of mean strength	286.88	180.27	168.23	151.06	159.13	322.03	168.23	183.74	177.62	268.10
Per 1,000 for previous year	211.76	266.43	206.44	176.82	189.16	....	181.27	213.66	200.91	180.67
Discharges for disability, all causes	144	33	408	796	1,204	75	408	1,048	1,456	813
Per 1,000 of mean strength	16.57	15.14	12.98	22.46	18	38.52	12.98	21.71	18.27	39.29
Per 1,000 for previous year	20.25	19.85	14.92	19.89	17.82	....	13.98	21.79	18.71	26.95
Discharges for disease	115	30	321	604	925	35	321	784	1,105	673
Per 1,000 of mean strength	13.23	13.76	10.21	17.04	13.83	17.98	10.21	16.24	13.86	32.52
Per 1,000 for previous year	16.26	16.63	11.62	14.26	13.16	....	11.40	16.26	14.35	22.28
Discharges for injury	29	3	87	192	279	40	87	264	351	140
Per 1,000 of mean strength	3.34	1.38	2.77	5.42	4.17	20.54	2.77	5.47	4.40	6.77
Per 1,000 for previous year	3.99	3.22	3.30	5.63	4.66	....	2.58	5.52	4.36	4.67
Deaths from all causes	85	11	1,138	785	1,923	93	1,138	984	2,122	161
Per 1,000 of mean strength	9.78	5.05	36.20	22.15	28.75	47.76	36.20	20.39	26.63	7.78
Per 1,000 for previous year	18.30	11.27	29.83	31.10	30.58	....	25.18	25.76	25.53	7.89
Deaths from disease	73	11	784	571	1,355	46	784	701	1,485	100
Per 1,000 of mean strength	8.40	5.05	24.94	16.11	20.26	23.62	24.94	14.52	18.63	4.83
Per 1,000 for previous year	16.36	9.12	11.80	17.80	15.30	....	12.77	16.89	15.27	6.56
Deaths from injury	12	....	354	214	568	47	354	283	637	61
Per 1,000 of mean strength	1.38	....	11.26	6.04	8.49	24.14	11.26	5.86	7.99	2.95
Per 1,000 for previous year	1.94	2.15	18.03	13.30	15.28	....	12.41	8.87	10.26	1.33

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1889–1898.*

Year 1900.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	100,389						92,374						8,015					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.06	......	......	1	0.01	6	0.06	......	......	1	0.01	......	......	......	......	......	......
Measles	568	5.66	......	......	7	.07	543	5.88	......	......	7	.08	25	3.12	......	......	......	......
Smallpox	261	2.60	......	......	114	1.14	176	1.91	......	......	73	.79	85	10.60	......	......	41	5.12
Vaccinia	2,036	20.28	......	......	......	......	1,911	20.69	......	......	......	......	125	15.60	......	......	......	......
Influenza	1,632	16.26	......	......	1	.01	1,582	17.13	......	......	1	.01	50	6.24	......	......	......	......
Dengue	3,321	33.08	......	......	......	......	3,249	35.17	......	......	......	......	72	8.98	......	......	......	......
Mumps	569	5.67	......	......	......	......	522	5.65	......	......	......	......	47	5.86	......	......	......	......
Diphtheria	45	.45	......	......	4	.04	43	.47	......	......	4	.04	2	.25	......	......	......	......
Typhoid fever	978	9.74	3	0.03	164	1.63	943	10.21	3	0.03	154	1.67	31	3.87	......	......	10	1.25
Yellow fever	144	1.43	......	......	32	.32	148	1.60	......	......	32	.35	......	......	......	......	......	......
Cerebrospinal fever	11	.11	......	......	10	.10	11	.12	......	......	10	.11	......	......	......	......	......	......
Malarial fever, intermittent	55,814	555.98	2	.02	......	......	52,589	569.31	2	.02	......	......	3,225	402.37	......	......	......	......
Malarial fever, remittent	11,831	117.85	......	......	25	.25	11,355	122.92	......	......	23	.25	476	59.39	......	......	2	.25
Malarial fever, pernicious	220	2.19	1	.01	96	.96	210	2.27	1	.01	90	.97	10	1.25	......	......	6	.75
Malarial cachexia	3,062	30.50	40	.40	15	.15	2,957	32.01	39	.42	15	.16	105	13.10	1	0.12	......	......
Fever, undetermined	2,223	22.15	......	......	2	.02	2,088	22.60	......	......	2	.02	135	16.84	......	......	......	......
Erysipelas	105	1.05	......	......	1	.01	101	1.09	......	......	1	.01	4	.50	......	......	......	......
Septicæmia and tetanus	32	.32	1	.01	20	.20	27	.29	1	.01	19	.21	5	.62	......	......	1	.12
Rheumatic fever	433	4.31	2	.02	1	.01	399	4.32	2	.02	......	......	34	4.24	......	......	1	.12
Consumption	494	4.92	137	1.36	96	.96	448	4.85	123	1.33	84	.91	46	5.74	14	1.75	12	1.50
Cancer	16	.16	3	.03	1	.01	16	.17	3	.03	1	.01	......	......	......	......	......	......
Syphilis and results	1,589	15.83	174	1.73	5	.05	1,463	15.84	160	1.73	5	.05	126	15.72	14	1.75	......	......
Gonorrhea and results	7,899	78.69	58	.58	......	......	7,223	78.19	55	.60	......	......	676	84.33	3	.37	......	......
Chancroid and results	3,960	39.45	5	.05	1	.01	3,524	38.15	2	.02	......	......	436	54.40	3	.37	1	.12
Infections, other	153	1.52	9	.09	6	.06	142	1.54	9	.10	4	.04	11	1.37	......	......	2	.25
Total infectious diseases	97,402	970.24	435	4.33	602	6.00	91,676	992.43	400	4.33	526	5.69	5,726	714.41	35	4.37	76	9.48
Anemia	496	4.94	4	.04	6	.06	486	5.26	3	.03	6	.06	10	1.25	1	.12	......	......
Nutrition, others	114	1.14	56	.56	1	.01	110	1.19	54	.58	1	.01	4	.50	2	.25	......	......
Total diseases of nutrition	610	6.08	60	.60	7	.07	596	6.45	57	.62	7	.08	14	1.75	3	.37	......	......

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	100,389						92,374						8,015					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	1,540	15.34	13	0.13	18	0.18	1,502	16.26	13	0.14	17	0.18	38	4.74			1	0.12
Brain and spinal cord	395	3.93	99	.99	17	.17	357	3.87	96	1.04	16	.17	38	4.74	3	0.37	1	.12
Insanity	273	2.72	149	1.48	3	.03	248	2.68	139	1.50	3	.03	25	3.12	10	1.25		
Meningitis	26	.26	1	.01	5	.05	25	.27	1	.01	5	.05	1	.12				
Poisoning, narcotic	74	.74	7	.07	9	.09	72	.78	7	.08	9	.10	2	.25				
Nervous system, others	2,639	26.29	65	.65	5	.05	2,288	24.77	61	.66	5	.05	351	43.79	4	.50		
Total diseases of the nervous system	4,947	49.28	334	3.33	57	.57	4,492	48.63	317	3.43	55	.60	455	56.77	17	2.12	2	.25
Poisoning, irritant	285	2.84	2	.02	3	.03	273	2.96	2	.02	3	.03	12	1.50				
Tonsillitis, pharyngitis, and sore throat	3,520	35.06					3,200	34.64					320	39.92				
Peritonitis	29	.29			15	.15	27	.29			15	.16	2	.25				
Dyspepsia, colic, and constipation	8,700	86.67	7	.07			7,797	84.41	7	.08			903	112.65				
Gastritis	3,611	35.97	20	.20	4	.04	3,467	37.53	20	.22	4	.04	144	17.97				
Dysentery, acute	6,339	63.15	7	.07	229	2.28	5,946	64.37	7	.08	218	2.36	393	49.03			11	1.37
Dysentery, chronic	3,180	31.68	111	1.11	336	3.35	3,026	32.76	111	1.20	327	3.54	154	19.21			9	1.12
Diarrheal diseases, others	37,161	370.18	63	.63	84	.84	35,636	385.78	63	.68	84	.91	1,525	190.26				
Enteritis	1,598	15.92	18	.18	29	.29	1,459	15.79	18	.19	29	.31	139	17.34				
Perityphlitis and appendicitis	259	2.58	9	.09	20	.20	240	2.60	8	.09	15	.16	19	2.37	1	.12	5	.62
Digestive system, others	4,461	44.44	54	.54	38	.38	4,128	44.69	53	.57	36	.39	333	41.55	1	.12	2	.25
Total diseases of the digestive system	69,143	688.75	291	2.90	758	7.55	65,199	705.82	289	3.13	731	7.91	3,944	492.08	2	.25	27	3.37
Heart, diseases of	524	5.22	85	.85	43	.43	486	5.26	77	.83	39	.42	38	4.74	8	1	4	.50
Arteries and veins	216	2.15	32	.32	7	.07	205	2.22	32	.35	5	.05	11	1.37			2	.25
Total diseases of the circulatory system	740	7.37	117	1.17	50	.50	691	7.48	109	1.18	44	.48	49	6.11	8	1	6	.75
Bronchitis	4,874	48.55	12	.12			4,487	48.58	12	.13			387	48.28				
Pneumonia	270	2.69	2	.02	40	.40	242	2.62	2	.02	38	.41	28	3.49			2	.25
Pleurisy	409	4.07	20	.20	7	.07	369	3.99	19	.21	5	.05	40	4.99	1	.12	2	.25
Respiratory system, others	2,125	21.17	25	.25	9	.09	2,029	21.97	21	.23	7	.08	96	11.98	4	.50	2	.25
Total diseases of the respiratory system	7,678	76.48	59	.59	56	.56	7,127	77.16	54	.58	50	.54	551	68.75	5	.62	6	.75

Kidneys, diseases of	370	3.69	32	.32	47	.47	342	3.70	31	.34	44	.48	28	3.49	1	.12	3	.37
Varicocele	392	3.91	21	.21	......	......	381	4.12	21	.23	......	......	11	1.37	......	......	......	......
Genito-urinary, others	1,168	11.64	22	.22	1	.01	1,071	11.59	20	.22	1	.01	97	12.10	2	.25	......	......
Total diseases of the genito-urinary system	1,930	19.23	75	.75	48	.48	1,794	19.42	72	.78	45	.49	136	16.97	3	.37	3	.37
Adenitis	742	7.39	5	.05	......	......	673	7.29	4	.04	......	......	69	8.61	1	.12	......	......
Lymphatic system, others	97	.97	3	.03	1	.01	90	.97	2	.02	1	.01	7	.87	1	.12	......	......
Total diseases of the lymphatic system	839	8.36	8	.08	1	.01	763	8.26	6	.06	1	.01	76	9.48	2	.25	......	......
Rheumatism, muscular	3,989	39.74	22	.22	......	......	3,505	37.95	20	.22	......	......	484	60.39	2	.25	......	......
Osteitis and periostitis	193	1.92	8	.08	......	......	174	1.88	7	.08	......	......	19	2.37	1	.12	......	......
Arthritis and synovitis	932	9.28	26	.26	1	.01	831	9.00	24	.26	1	.01	101	12.60	2	.25	......	......
Rheumatism, chronic articular	676	6.73	66	.66	......	......	593	6.42	60	.65	......	......	83	10.35	6	.75	......	......
Muscles, bones, and joints, others	452	4.50	50	.50	......	......	412	4.46	44	.48	......	......	40	4.99	6	.75	......	......
Total diseases of the muscles, bones, and joints	6,242	62.18	172	1.71	1	.01	5,515	59.71	155	1.68	1	.01	727	90.70	17	2.12	......	......
Total diseases of the integumentary system	18,856	187.84	10	.10	1	.01	17,880	193.58	8	.09	1	.01	976	121.77	2	.25	......	......
Total diseases of the eye	1,528	15.22	95	.95	......	......	1,390	15.05	88	.95	......	......	138	17.22	7	.87	......	......
Total diseases of the ear	1,561	15.55	111	1.11	......	......	1,515	16.40	107	1.16	......	......	46	5.74	4	.50	......	......
Total diseases of the nose	107	1.07	11	.11	......	......	99	1.07	8	.09	......	......	8	1.00	3	.37	......	......
Total unclassified and undiagnosed	794	7.91	......	......	4	.04	603	6.53	......	......	4	.04	191	23.83	......	......	......	......
Total for diseases	212,377	2,115.54	1,778	17.71	1,585	15.79	199,340	2,157.97	1,670	18.08	1,465	15.86	13,037	1,626.57	108	13.48	120	14.97
Drowning	7	.07	......	......	116	1.16	7	.08	......	......	98	1.06	......	......	......	......	18	2.25
Exhaustion from exposure and fatigue	750	7.47	2	.02	2	.02	714	7.73	2	.02	2	.02	36	4.49	......	......	......	......
Heat stroke	195	1.94	8	.08	9	.09	188	2.04	7	.08	7	.08	7	.87	1	.12	2	.25
Lightning stroke	4	.04	......	......	......	......	3	.03	......	......	......	......	1	.12	......	......	......	......
Venomous bites, stings, and wounds	855	8.52	3	.03	1	.01	821	8.89	3	.03	......	......	34	4.24	......	......	1	.12
Abrasions, blisters, burns, and scalds	2,515	25.05	......	......	1	.01	2,371	25.67	......	......	1	.01	144	17.97	......	......	......	......
Compression and concussion of brain	38	.38	3	.03	4	.04	37	.40	3	.03	3	.03	1	.12	......	......	1	.12
Contusions and sprains	7,572	75.42	4	.04	......	......	6,800	73.61	4	.04	......	......	772	96.32	......	......	......	......
Dislocations	267	2.66	9	.09	......	......	246	2.66	8	.09	......	......	21	2.62	1	.12	......	......
Fractures (not shot)	710	7.07	44	.44	11	.11	678	7.34	42	.45	11	.12	32	3.99	2	.25	......	......
Hernia	592	5.90	102	1.02	......	......	557	6.03	96	1.04	......	......	35	4.37	6	.75	......	......
Wounds, contused, lacerated, and punctured	2,352	23.43	6	.06	5	.05	2,082	22.54	6	.06	4	.04	270	33.69	......	......	1	.12
Wounds, incised	1,257	12.52	6	.06	58	.58	1,132	12.25	6	.06	56	.61	125	15.59	......	......	2	.25
Wounds, gunshot	1,173	11.69	235	2.34	471	4.69	1,089	11.79	221	2.39	439	4.75	84	10.48	14	1.75	32	3.99
Secondary results of injury	440	4.38	58	.58	2	.02	405	4.38	55	.60	1	.01	35	4.37	3	.37	1	.12
Other injuries	976	9.72	11	.11	18	.18	849	9.19	10	.11	18	.19	127	15.84	1	.12	......	......
Total for injuries	19,703	196.27	491	4.89	698	6.95	17,979	194.63	463	5.01	640	6.93	1,724	215.10	28	3.49	58	7.24
Total for diseases and injuries	232,080	2,311.81	2,269	22.60	2,283	22.74	217,319	2,352.60	2,133	23.09	2,105	22.79	14,761	1,841.67	136	16.97	178	22.21

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Regular Army.						White troops, Regulars.						Colored troops, Regulars.					
Mean strength	68,955						63,581						5,374					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	5	0.07			1	0.01	5	0.08			1	0.02						
Measles	311	4.51			2	.03	304	4.78			2	.03	7	1.30				
Smallpox	95	1.38			24	.35	75	1.18			15	.24	20	3.72			9	1.67
Vaccinia	1,708	24.77					1,599	25.15					109	20.28				
Influenza	1,371	19.88			1	.01	1,322	20.79			1	.02	49	9.12				
Dengue	1,500	21.75					1,468	23.09					32	5.95				
Mumps	268	3.89					242	3.81					26	4.84				
Diphtheria	34	.49			2	.03	32	.50			2	.03	2	.37				
Typhoid fever	531	7.70	2	0.03	60	.87	506	7.96	2	0.03	52	.82	25	4.65			8	1.49
Yellow fever	148	2.15			32	.46	148	2.33			32	.50						
Cerebro spinal fever	5	.07			5	.07	5	.08			5	.08						
Malarial fever, intermittent	27,670	401.28	2	.03			25,279	397.59	2	.03			2,391	444.92				
Malarial fever, remittent	6,916	100.30			14	.20	6,497	102.18			14	.22	419	77.97				
Malarial fever, pernicious	109	1.58	1	.01	54	.78	104	1.64	1	.02	52	.82	5	.93			2	.37
Malarial cachexia	1,380	20.01	31	.45	6	.09	1,283	20.18	30	.47	6	.09	97	18.05	1	0.19		
Fever, undetermined	1,354	19.64			2	.03	1,254	19.72			2	.03	100	18.61				
Erysipelas	85	1.23					81	1.27					4	.74				
Septicæmia and tetanus	21	.30	1	.01	13	.19	19	.30	1	.02	13	.20	2	.37				
Rheumatic fever	280	4.06	2	.03	1	.01	259	4.07	2	.03			21	3.91			1	.19
Consumption	334	4.84	116	1.68	52	.75	305	4.80	103	1.62	47	.74	29	5.40	13	2.42	5	.93
Cancer	12	.17	3	.04	1	.01	12	.19	3	.05	1	.02						
Syphilis and results	1,273	18.46	163	2.36	3	.04	1,173	18.45	150	2.36	3	.05	100	18.61	13	2.42		
Gonorrhea and results	6,460	93.68	57	.83			5,909	92.93	54	.85			551	102.53	3	.56		
Chancroid and results	3,202	46.44	4	.06			2,897	45.56	1	.02			305	56.76	3	.56		
Infections, other	114	1.65	8	.12	5	.07	110	1.73	8	.13	4	.06	4	.74			1	.19
Total infectious diseases	55,186	800.32	390	5.66	278	4.03	50,888	800.36	357	5.61	252	3.96	4,298	799.78	33	6.14	26	4.84
Anemia	255	3.70	4	.06	3	.04	247	3.88	3	.05	3	.05	8	1.49	1	.19		
Nutrition, others	95	1.38	53	.77			91	1.43	51	.80			4	.74	2	.37		
Total diseases of nutrition	350	5.08	57	.83	3	.04	338	5.32	54	.85	3	.05	12	2.23	3	.56		
Alcoholism	1,267	18.38	12	.17	12	.17	1,231	19.36	12	.19	12	.19	36	6.70				
Brain and spinal cord	269	3.90	81	1.17	13	.19	246	3.87	78	1.23	13	.20	23	4.28	3	.56		
Insanity	150	2.18	110	1.60	2	.03	136	2.14	102	1.60	2	.03	14	2.61	8	1.49		
Meningitis	14	.20			2	.03	13	.20			2	.03	1	.19				

Poisoning, narcotic	60	.87	7	.10	6	.09	58	.91	7	.11	6	.09	2	.37	......	......
Nervous system, others	1,950	28.28	51	.74	4	.06	1,708	26.86	48	.75	4	.06	242	45.03	3	.56
Total diseases of the nervous system	3,710	53.80	261	3.79	39	.57	3,392	53.35	247	3.88	39	.61	318	59.17	14	2.61
Poisoning, irritant	268	3.89	2	.03	3	.04	260	4.09	2	.03	3	.05	8	1.49	......	......
Tonsillitis, pharyngitis, and sore throat	2,822	40.93	......	......	......	......	2,554	40.17	......	......	......	......	268	49.87	......	......
Peritonitis	18	.26	......	......	7	.10	16	.25	......	......	7	.11	2	.37	......	......
Dyspepsia, colic, and constipation	5,887	85.38	5	.07	......	......	5,208	81.91	5	.08	......	......	679	126.35	......	......
Gastritis	2,065	29.95	15	.22	2	.03	1,950	30.67	15	.24	2	.03	115	21.40	......	......
Dysentery, acute	3,398	49.28	7	.10	93	1.35	3,141	49.40	7	.11	87	1.37	257	47.82	......	......
Dysentery, chronic	1,559	22.61	86	1.25	182	2.64	1,415	22.25	86	1.35	173	2.72	144	26.80	......	......
Diarrheal diseases, others	18,586	269.54	47	.68	32	.46	17,571	276.35	47	.74	32	.50	1,015	188.89	......	......
Enteritis	1,166	16.91	9	.13	20	.29	1,045	16.43	9	.14	20	.31	121	22.52	......	......
Perityphlitis and appendicitis	179	2.60	8	.12	11	.16	167	2.63	8	.13	9	.14	12	2.23	......	......
Digestive system, others	2,846	41.28	47	.68	27	39	2,585	40.66	46	.72	26	.41	261	48.57	1	.19
Total diseases of the digestive system	38,794	562.60	226	3.28	377	5.47	35,912	564.82	225	3.54	359	5.65	2,882	536.29	1	.19
Heart, diseases of	380	5.51	75	1.09	37	.54	343	5.39	67	1.05	33	.52	37	6.89	8	1.49
Arteries and veins	144	2.09	27	.39	6	.09	135	2.12	27	.42	4	.06	9	1.67	......	......
Total diseases of the circulatory system	524	7.60	102	1.48	43	.62	478	7.53	94	1.48	37	.58	46	8.56	8	1.49
Bronchitis	3,472	50.36	9	.13	......	......	3,155	49.62	9	.14	......	......	317	58.99	......	......
Pneumonia	188	2.73	1	.01	16	.23	172	2.71	1	.02	15	.24	16	2.98	......	......
Pleurisy	289	4.19	15	.22	4	.06	264	4.15	14	.22	3	.05	25	4.65	1	.19
Respiratory system, others	1,570	22.77	20	.29	4	.06	1,503	23.64	17	.27	4	.06	67	12.47	3	.56
Total diseases of the respiratory system	5,519	80.04	45	.65	24	.35	5,094	80.12	41	.64	22	.35	425	79.08	4	.74
Kidneys, diseases of	248	3.60	27	.39	30	.44	232	3.65	26	.41	28	.44	16	2.98	1	.19
Varicocele	281	4.08	21	.30	......	......	274	4.31	21	.33	......	......	7	1.30	......	......
Genito-urinary, others	792	11.49	21	.30	......	......	725	11.40	19	.30	......	......	67	12.47	2	.37
Total diseases of the genito-urinary system	1,321	19.16	69	1.00	30	.44	1,231	19.36	66	1.04	28	.44	90	16.75	3	.56
Adenitis	542	7.86	5	.07	......	......	488	7.68	4	.06	......	......	54	10.05	1	.19
Lymphatic system, others	63	.91	1	.01	1	.01	59	.93	1	.02	1	.02	4	.74	......	......
Total diseases of the lymphatic system	605	8.77	6	.09	1	.01	547	8.60	5	.08	1	.02	58	10.79	1	.19
Rheumatism, muscular	2,869	41.61	18	.26	......	......	2,464	38.75	16	.25	......	......	405	75.37	2	.37
Osteitis and periostitis	128	1.86	7	.10	......	......	115	1.81	6	.09	......	......	13	2.42	1	.19
Arthritis and synovitis	684	9.92	21	.30	1	.01	608	9.56	19	.30	1	.02	76	14.14	2	.37
Rheumatism, chronic articular	490	7.11	47	.68	......	......	431	6.78	43	.68	......	......	59	10.98	4	.74
Muscles, bones, and joints, others	377	5.47	38	.55	......	......	340	5.35	33	.52	......	......	37	6.89	5	.93
Total diseases of the muscles, bones, and joints	4,548	65.96	131	1.90	1	.01	3,958	62.25	117	1.84	1	.02	590	109.79	14	2.61

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Regular Army.						White troops Regulars.						Colored troops, Regulars.					
Mean strength	68,955						63,581						5,374					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	12,482	181.03	10	0.15	1	0.01	11,769	185.10	8	0.13	1	0.02	713	132.67	2	0.37	......	......
Total diseases of the eye	1,082	15.69	75	1.09	......	......	962	15.13	70	1.10	......	......	120	22.33	5	.93	......	......
Total diseases of the ear	976	14.16	76	1.10	......	......	946	14.88	73	1.15	......	......	30	5.58	3	.56	......	......
Total diseases of the nose	84	1.22	9	.13	......	......	78	1.23	6	.09	......	......	6	1.12	3	.56	......	......
Total unclassified and undiagnosed	382	5.54	......	......	4	.06	194	3.05	......	......	4	.06	188	34.98	......	......	......	......
Total for diseases	125,563	1,820.94	1,457	21.13	801	11.62	115,787	1,821.09	1,363	21.44	747	11.75	9,776	1,819.13	94	17.49	54	10.05
Drowning	7	.10	......	......	77	1.12	7	.11	......	......	69	1.09	......	......	......	......	8	1.49
Exhaustion from exposure and fatigue	350	5.08	2	.03	2	.03	323	5.08	2	.03	2	.03	27	5.02	......	......	......	......
Heat stroke	129	1.87	7	.10	5	.07	124	1.95	6	.09	4	.06	5	.93	1	.19	1	.19
Lightning stroke	3	.04	......	......	......	......	2	.03	......	......	......	......	1	.19	......	......	......	......
Venomous bites, stings, and wounds	597	8.66	2	.03	1	.01	567	8.92	2	.03	......	......	30	5.58	......	......	......	......
Abrasions, blisters, burns, and scalds	1,525	22.12	......	......	1	.01	1,419	22.32	......	......	1	.02	106	19.72	......	......	......	......
Compression and concussion of brain	30	.44	3	.04	3	.04	29	.46	3	.05	2	.03	1	.19	......	......	1	.19
Contusions and sprains	6,132	88.93	3	.04	......	......	5,434	85.46	3	.05	......	......	698	129.88	......	......	......	......
Dislocations	216	3.13	9	.13	......	......	197	3.10	8	.13	......	......	19	3.54	1	.19	......	......
Fractures (not shot)	550	7.98	39	.57	7	.10	523	8.23	37	.58	7	.11	27	5.02	2	.37	......	......
Hernia	346	5.02	78	1.13	......	......	318	5.00	73	1.15	......	......	28	5.21	5	.93	......	......
Wounds, contused, lacerated, and punctured	1,854	26.89	6	.09	4	.06	1,618	25.45	6	.09	3	.05	236	43.92	......	......	1	.19
Wounds, incised	855	12.40	3	.04	13	.19	749	11.78	3	.05	12	.19	106	19.72	......	......	1	.19
Wounds, gunshot	564	8.18	185	2.68	216	3.13	500	7.86	172	2.71	192	3.02	64	11.91	13	2.42	24	4.47
Secondary results of injury	369	5.35	58	.84	2	.03	336	5.28	55	.87	1	.02	33	6.14	3	.56	1	.19
Other injuries	888	12.88	9	.13	13	.19	763	12.00	8	.13	13	.20	125	23.26	1	.19	......	......
Total for injuries	14,415	209.05	404	5.86	344	4.99	12,909	203.03	378	5.94	306	4.81	1,506	280.24	26	4.84	38	7.07
Total for diseases and injuries	139,978	2,029.99	1,861	26.99	1,145	16.61	128,696	2,024.13	1,741	27.38	1,053	16.56	11,282	2,099.37	120	22.33	92	17.12

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Volunteer Army.						White troops, Volunteers.						Colored troops, Volunteers.					
Mean strength	31,434						28,793						2,641					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.03	......	......	......	......	1	0.03	......	......	......	......	......	......	......	......	......	......
Measles	257	8.18	......	......	5	0.16	239	8.30	......	......	5	0.17	18	6.82	......	......	......	......
Smallpox	166	5.28	......	......	90	2.86	101	3.51	......	......	58	2.01	65	24.61	......	......	32	12.12
Vaccinia	328	10.43	......	......	......	......	312	10.84	......	......	......	......	16	6.06	......	......	......	......
Influenza	261	8.30	......	......	......	......	260	9.03	......	......	......	......	1	.38	......	......	......	......
Dengue	1,821	57.93	......	......	......	......	1,781	61.86	......	......	......	......	40	15.15	......	......	......	......
Mumps	301	9.58	......	......	......	......	280	9.72	......	......	......	......	21	7.95	......	......	......	......
Diphtheria	11	.35	......	......	2	.06	11	.38	......	......	2	.07	......	......	......	......	......	......
Typhoid fever	443	14.09	1	0.03	104	3.31	437	15.18	1	0.03	102	3.54	6	2.27	......	......	2	.76
Cerebro spinal fever	6	.19	......	......	5	.16	6	.21	......	......	5	.17	......	......	......	......	......	......
Malarial fever, intermittent	28,144	895.34	......	......	......	......	27,310	948.49	......	......	......	......	834	315.79	......	......	......	......
Malarial fever, remittent	4,915	156.37	......	......	11	.35	4,858	168.72	......	......	9	.31	57	21.58	......	......	2	.76
Malarial fever, pernicious	111	3.53	......	......	42	1.34	106	3.68	......	......	38	1.32	5	1.89	......	......	4	1.51
Malarial cachexia	1,682	53.51	9	.29	9	.29	1,674	58.14	9	.31	9	.31	8	3.03	......	......	......	......
Fever, undetermined	869	27.65	......	......	......	......	834	28.97	......	......	......	......	35	13.25	......	......	......	......
Erysipelas	20	.64	......	......	1	.03	20	.69	......	......	1	.03	......	......	......	......	......	......
Septicæmia and tetanus	11	.35	......	......	7	.22	8	.28	......	......	6	.21	3	1.14	......	......	1	.38
Rheumatic fever	153	4.87	......	......	......	......	140	4.86	......	......	......	......	13	4.92	......	......	......	......
Consumption	160	5.09	21	.67	44	1.40	143	4.97	20	.69	37	1.28	17	6.44	1	0.38	7	2.65
Cancer	4	.13	......	......	......	......	4	.14	......	......	......	......	......	......	......	......	......	......
Syphilis and results	316	10.05	11	.35	2	.06	290	10.07	10	.35	2	.07	26	9.84	1	.38	......	......
Gonorrhea and results	1,439	45.78	1	.03	......	......	1,314	45.64	1	.03	......	......	125	47.33	......	......	......	......
Chancroid and results	758	24.11	1	.03	1	.03	627	21.78	1	.03	......	......	131	49.60	......	......	1	.38
Infections, other	39	1.24	1	.03	1	.03	32	1.11	1	.03	......	......	7	2.65	......	......	1	.38
Total infectious diseases	42,216	1,343.00	45	1.43	324	10.31	40,788	1,416.59	43	1.49	274	9.52	1,428	540.70	2	.76	50	18.93
Anemia	241	7.67	......	......	3	.10	239	8.30	......	......	3	.10	2	.76	......	......	......	......
Nutrition, others	19	.60	3	.10	1	.03	19	.66	3	.10	1	.03	......	......	......	......	......	......
Total diseases of nutrition	260	8.27	3	.10	4	.13	258	8.96	3	.10	4	.14	2	.76	......	......	......	......
Alcoholism	273	8.68	1	.03	6	.19	271	9.41	1	.03	5	.17	2	.76	......	......	1	.38
Brain and spinal cord	126	4.01	18	.57	4	.13	111	3.86	18	.63	3	.10	15	5.68	......	......	1	.38
Insanity	123	3.91	39	1.24	1	.03	112	3.89	37	1.28	1	.03	11	4.17	2	.76	......	......

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Volunteer Army.						White troops, Volunteers.						Colored troops, Volunteers.					
Mean strength	31,434						28,793						2,641					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Meningitis	12	0.38	1	0.03	3	0.10	12	0.42	1	0.03	3	0.10	......	......	......	......	......	......
Poisoning, narcotic	14	.45	......	......	3	.10	14	.49	......	......	3	.10	......	......	......	......	......	......
Nervous system, others	689	21.92	14	.45	1	.03	580	20.14	13	.45	1	.03	109	41.27	1	0.38	......	......
Total diseases of the nervous system	1,237	39.35	73	2.32	18	.57	1,100	38.20	70	2.43	16	.56	137	51.87	3	1.14	2	0.76
Poisoning, irritant	17	.54	......	......	......	......	13	.45	......	......	......	......	4	1.51	......	......	......	......
Tonsillitis, pharyngitis, and sore throat	698	22.21	......	......	......	......	646	22.44	......	......	......	......	52	19.69	......	......	......	......
Peritonitis	11	.35	......	......	8	.25	11	.38	......	......	8	.28	......	......	......	......	......	......
Dyspepsia, colic, and constipation	2,813	89.49	2	.06	......	......	2,589	89.92	2	.07	......	......	224	84.82	......	......	......	......
Gastritis	1,546	49.18	5	.16	2	.06	1,517	52.68	5	.17	2	.07	29	10.98	......	......	......	......
Dysentery, acute	2,941	93.56	......	......	136	4.33	2,805	97.42	......	......	131	4.55	136	51.50	......	......	5	1.89
Dysentery, chronic	1,621	51.57	25	.80	154	4.90	1,611	55.95	25	.87	154	5.35	10	3.79	......	......	......	......
Diarrheal diseases, others	18,575	590.92	16	.51	52	1.65	18,065	627.41	16	.56	52	1.81	510	193.11	......	......	......	......
Enteritis	432	13.74	9	.29	9	.29	414	14.38	9	.31	9	.31	18	6.82	......	......	......	......
Perityphlitis and appendicitis	80	2.55	1	.03	9	.29	73	2.54	......	......	6	.21	7	2.65	1	.38	3	1.14
Digestive system, others	1,615	51.38	7	.22	11	.35	1,543	53.59	7	.24	10	.35	72	27.26	......	......	1	.38
Total diseases of the digestive system	30,349	965.48	65	2.07	381	12.12	29,287	1,017.16	64	2.22	372	12.92	1,062	402.12	1	.38	9	3.41
Heart, diseases of	144	4.58	10	.32	6	.19	143	4.97	10	.35	6	.21	1	.38	......	......	......	......
Arteries and veins	72	2.29	5	.16	1	.03	70	2.43	5	.17	1	.03	2	.76	......	......	......	......
Total diseases of the circulatory system	216	6.87	15	.48	7	.22	213	7.40	15	.52	7	.24	3	1.14	......	......	......	......
Bronchitis	1,402	44.60	3	.10	......	......	1,332	46.26	3	.10	......	......	70	26.50	......	......	......	......
Pneumonia	82	2.61	1	.03	24	.76	70	2.43	1	.03	23	.80	12	4.54	......	......	1	.38
Pleurisy	120	3.82	5	.16	3	.10	105	3.65	5	.17	2	.07	15	5.68	......	......	1	.38
Respiratory system, others	555	17.66	5	.16	5	.16	526	18.27	4	.14	3	.10	29	10.98	1	.38	2	.76
Total diseases of the respiratory system	2,159	68.68	14	.45	32	1.02	2,033	70.61	13	.45	28	.97	126	47.71	1	.38	4	1.51
Kidneys, diseases of	122	3.88	5	.16	17	.54	110	3.82	5	.17	16	.56	12	4.54	......	......	1	.38

Varicocele	111	3.53					107	3.72					4	1.51				
Genito-urinary, others	376	11.96	1	.03	1	.03	346	12.02	1	.03	1	.03	30	11.36				
Total diseases of the genito-urinary system	609	19.37	6	.19	18	.57	563	19.55	6	.21	17	.59	46	17.42			1	.38
Adenitis	200	6.36					185	6.42					15	5.68				
Lymphatic system, others	34	1.08	2	.06			31	1.08	1	.03			3	1.14	1	.38		
Total diseases of the lymphatic system	234	7.44	2	.06			216	7.50	1	.03			18	6.82	1	.38		
Rheumatism, muscular	1,120	35.63	4	.13			1,041	36.15	4	.14			79	29.91				
Osteitis and periostitis	65	2.07	1	.03			59	2.05	1	.03			6	2.27				
Arthritis and synovitis	248	7.89	5	.16			223	7.74	5	.17			25	9.47				
Rheumatism, chronic articular	186	5.92	19	.60			162	5.63	17	.59			24	9.09	2	.76		
Muscles, bones, and joints, others	75	2.39	12	.38			72	2.50	11	.38			3	1.14	1	.38		
Total diseases of the muscles, bones, and joints	1,694	53.89	41	1.30			1,557	54.08	38	1.32			137	51.87	3	1.14		
Total diseases of the integumentary system	6,374	202.78					6,111	212.24					263	99.59				
Total diseases of the eye	446	14.19	20	.64			428	14.86	18	.63			18	6.82	2	.76		
Total diseases of the ear	585	18.61	35	1.11			569	19.76	34	1.18			16	6.06	1	.38		
Total diseases of the nose	23	.73	2	.06			21	.73	2	.07			2	.76				
Total unclassified and undiagnosed	412	13.11					409	14.20					3	1.14				
Total for diseases	86,814	2,761.79	321	10.21	784	24.94	83,553	2,901.85	307	10.66	718	24.94	3,261	1,234.76	14	5.30	66	24.99
Drowning					39	1.24					29	1.01					10	3.79
Exhaustion from exposure and fatigue	400	12.73					391	13.58					9	3.41				
Heat stroke	66	2.10	1	.03	4	.13	64	2.22	1	.03	3	.10	2	.76			1	.38
Lightning stroke	1	.03					1	.03										
Venomous bites, stings, and wounds	258	8.21	1	.03			254	8.82	1	.03			4	1.51				
Abrasions, blisters, burns, and scalds	990	31.50					952	33.06					38	14.39				
Compression and concussion of brain	8	.25			1	.03	8	.28			1	.03						
Contusions and sprains	1,440	45.81	1	.03			1,366	47.44	1	.03			74	28.02				
Dislocations	51	1.62					49	1.70					2	.76				
Fractures (not shot)	160	5.09	5	.16	4	.13	155	5.38	5	.17	4	.14	5	1.89				
Hernia	246	7.83	24	.76			239	8.30	23	.80			7	2.65	1	.38		
Wounds, contused, lacerated, and punctured	498	15.84			1	.03	464	16.12			1	.03	34	12.87				
Wounds, incised	402	12.79	3	.10	45	1.43	383	13.30	3	.10	44	1.53	19	7.19			1	.38
Wounds, gunshot	609	19.37	50	1.59	255	8.11	589	20.46	49	1.70	247	8.58	20	7.57	1	.38	8	3.03
Secondary results of injury	71	2.26					69	2.40					2	.76				
Other injuries	88	2.80	2	.06	5	.16	86	2.99	2	.07	5	.17	2	.76				
Total for injuries	5,288	168.23	87	2.77	354	11.26	5,070	176.08	85	2.95	334	11.60	218	82.54	2	.76	20	7.57
Total for diseases and injuries	92,102	2,930.01	408	12.98	1,138	36.20	88,623	3,077.94	392	13.61	1,052	36.54	3,479	1,317.30	16	6.06	86	32.56

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade, 1889-1898.	United States Army.						White troops.					
Mean strength	29,308						26,648					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	52	0.20	......	......	3	0.01	52	0.20	......	......	3	0.01
Measles	2,480	8.46	......	......	12	.04	2,390	8.97	......	......	12	.05
Smallpox	39	.13	......	......	9	.03	35	.13	......	......	9	.03
Vaccinia	10,832	36.96	1	0.003	......	......	9,985	37.47	1	0.004	......	......
Influenza	17,535	59.83	1	.003	47	.16	15,542	58.33	1	.004	43	.16
Dengue	1,004	3.43	......	......	......	......	1,001	3.76	......	......	......	......
Mumps	1,480	5.05	......	......	......	......	1,238	4.65	......	......	......	......
Diphtheria	159	.54	......	......	5	.02	139	.52	......	......	5	.02
Typhoid fever	5,387	18.38	21	.07	588	2.01	5,228	19.62	21	.08	558	2.09
Yellow fever	611	2.08	......	......	73	.25	414	1.55	......	......	48	.18
Cerebro spinal fever	44	.15	7	.02	19	.06	42	.16	7	.03	19	.07
Malarial fever, intermittent	36,555	124.73	......	......	9	.03	34,065	127.84	......	......	9	.03
Malarial fever, remittent	11,577	39.50	3	.01	75	.26	10,860	40.76	3	.01	66	.25
Malarial fever, pernicious	287	.98	......	......	82	.28	268	1.01	......	......	71	.27
Malarial cachexia	2,660	9.08	25	.09	4	.01	2,350	8.82	25	.09	4	.02
Fever, undetermined	4,154	14.17	......	......	......	......	3,817	14.32	......	......	......	......
Erysipelas	414	1.41	......	......	13	.04	383	1.44	......	......	9	.03
Septicæmia and tetanus	15	.05	......	......	12	.04	14	.05	......	......	11	.04
Rheumatic fever	1,451	4.95	16	.05	3	.01	1,311	4.92	13	.05	2	.01
Consumption	779	2.66	410	1.40	140	.48	646	2.42	345	1.29	103	.39
Cancer	58	.20	8	.03	31	.11	53	.20	7	.03	29	.11
Syphilis and results	3,762	12.84	304	1.04	9	.03	3,323	12.47	249	.93	8	.03
Gonorrhea and results	13,493	46.03	51	.17	......	......	12,302	46.16	49	.18	......	......
Chancroid and results	3,686	12.58	2	.01	......	......	3,235	12.14	2	.01	......	......
Infections, other	585	2.00	20	.07	20	.07	534	2.00	17	.06	18	.07
Total infectious diseases	119,099	406.37	869	2.97	1,154	3.94	109,227	409.89	740	2.78	1,027	3.85
Anemia	323	1.10	15	.05	5	.02	313	1.17	13	.05	5	.02
Nutrition, others	289	.99	96	.33	10	.03	263	.99	87	.33	9	.03
Total diseases of nutrition	612	2.09	111	.38	15	.05	576	2.16	100	.37	14	.05
Alcoholism	8,403	28.67	9	.03	60	.20	8,274	31.05	8	.03	60	.23
Brain and spinal cord	1,642	5.60	188	.64	77	.26	1,514	5.68	175	.66	71	.27

Insanity	331	1.13	287	.98	8	.03	311	1.17	273	1.02	7	.03
Meningitis	18	.06	1	.003	10	.03	17	.06	1	.004	9	.03
Poisoning, narcotic	140	.48	10	.03	18	.06	134	.50	9	.03	18	.07
Nervous system, others	9,417	32.13	152	.52	10	.03	8,315	31.20	144	.54	9	.03
Total diseases of the nervous system	19,951	68.07	647	2.21	183	.62	18,565	69.67	610	2.29	174	.65
Poisoning, irritant	243	.83	...	...	48	.16	233	.87	...	...	46	.17
Tonsillitis, pharyngitis, and sore throat	18,423	62.86	1	.003	1	.003	16,208	60.83	1	.004	1	.004
Peritonitis	61	.21	5	.02	17	.06	59	.22	5	.02	17	.06
Dyspepsia, colic, and constipation	16,826	57.41	39	.13	2	.01	14,929	56.02	35	.13	2	.01
Gastritis	1,377	4.70	23	.08	13	.04	1,308	4.91	21	.08	12	.05
Diarrheal diseases, others	36,029	122.93	37	.13	111	.38	33,780	126.77	35	.13	106	.40
Enteritis	996	3.40	5	.02	26	.09	957	3.59	5	.02	25	.09
Perityphlitis and appendicitis	239	.82	6	.02	21	.07	220	.83	6	.02	19	.07
Digestive system, others	8,536	29.12	59	.20	58	.20	7,622	28.61	53	.20	54	.20
Total diseases of the digestive system	82,730	282.28	175	.60	297	1.01	75,316	282.64	161	.60	282	1.06
Heart, diseases of	1,321	4.51	309	1.05	100	.34	1,220	4.58	284	1.07	92	.35
Arteries and veins	340	1.16	71	.24	28	.10	326	1.22	71	.27	20	.08
Total diseases of the circulatory system	1,661	5.67	380	1.30	128	.44	1,546	5.80	355	1.33	112	.42
Bronchitis	19,753	67.40	37	.13	4	.01	17,784	66.74	35	.13	4	.02
Pneumonia	1,051	3.59	8	.03	172	.59	899	3.37	7	.03	152	.57
Pleurisy	629	2.15	19	.06	7	.02	560	2.10	16	.06	6	.02
Respiratory system, others	8,522	29.08	47	.16	19	.06	7,804	29.29	45	.17	14	.05
Total diseases of the respiratory system	29,955	102.21	111	.38	202	.69	27,047	101.50	103	.39	176	.66
Kidneys, diseases of	485	1.65	52	.18	69	.24	433	1.62	47	.18	62	.23
Varicocele	327	1.12	38	.13	...	...	309	1.16	37	.14	...	...
Genito-urinary, others	1,962	6.69	72	.25	3	.01	1,696	6.36	63	.24	3	.01
Total diseases of the genito-urinary system	2,774	9.47	162	.56	72	.25	2,438	9.15	147	.55	65	.24
Adenitis	984	3.36	8	.03	...	...	859	3.22	8	.03	...	...
Lymphatic system, others	165	.56	5	.02	2	.01	148	.56	5	.02	2	.01
Total diseases of the lymphatic system	1,149	3.92	13	.04	2	.01	1,007	3.78	13	.05	2	.01
Rheumatism, muscular	14,180	48.38	138	.47	...	...	12,289	46.12	124	.47	...	...
Osteitis and periostitis	224	.76	27	.09	...	...	200	.75	20	.08	...	...
Arthritis and synovitis	1,048	3.55	110	.38	...	...	913	3.43	101	.38	...	...
Rheumatism, chronic articular	3,635	12.40	189	.64	1	.003	3,095	11.61	167	.63	1	.004
Muscles, bones, and joints, others	845	2.88	74	.25	2	.01	777	2.92	67	.25	1	.004
Total diseases of the muscles, bones, and joints	19,932	68.01	538	1.84	3	.01	17,274	64.81	479	1.80	2	.01

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade, 1889-1898.	United States Army.						White troops.					
Mean strength	29,308						26,648					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	20,573	70.19	38	0.13	4	0.01	19,392	72.78	33	0.12	2	0.01
Total diseases of the eye	4,415	15.06	211	.72			3,699	13.88	192	.72		
Total diseases of the ear	1,911	6.52	134	.46	4	.01	1,813	6.80	130	.49	3	.01
Total diseases of the nose	459	1.57	28	.10	1	.003	428	1.61	26	.10	1	.004
Total unclassified and undiagnosed	1,761	6.01	8	.03	11	.04	1,612	6.05	8	.03	8	.03
Total for diseases	306,982	1,047.44	3,425	11.68	2,076	7.08	279,940	1,050.52	3,097	11.62	1,868	7.01
Drowning					150	.51					139	.52
Exhaustion from exposure and fatigue	606	2.07	1	.003	11	.04	582	2.18	1	.004	11	.04
Heat stroke	706	2.41	10	.03	13	.04	677	2.54	9	.03	12	.05
Lightning stroke	12	.04			4	.01	11	.04			4	.02
Venomous bites, stings, and wounds	572	1.95	2	.01			525	1.97	2	.01		
Abrasions, blisters, burns, and scalds	5,400	18.42	4	.01			5,066	19.01	4	.02		
Compression and concussion of brain	180	.61	6	.02	20	.07	161	.60	6	.02	18	.07
Contusions and sprains	34,106	116.37	62	.21	5	.02	30,822	115.67	54	.20	4	.02
Dislocations	713	2.43	22	.08	1	.003	656	2.46	18	.07	1	.001
Fractures (not shot)	1,909	6.51	125	.43	42	.14	1,753	6.58	117	.44	34	.13
Hernia	830	2.83	269	.92	1	.003	763	2.86	247	.93	1	.001
Wounds, contused, lacerated, and punctured	8,738	29.81	38	.13	6	.02	7,634	28.65	34	.13	6	.02
Wounds, incised	4,476	1.53	20	.07	8	.03	4,008	15.04	20	.08	5	.02
Wounds, gunshot	2,158	7.37	231	.79	427	1.46	1,778	6.67	215	.81	363	1.36
Secondary results of injury	601	2.05	62	.21			521	1.96	56	.21		
Other injuries	7,208	24.59	57	.19	116	.40	6,292	23.62	48	.18	114	.43
Total for injuries	68,215	232.75	909	3.10	804	2.74	61,249	229.85	831	3.12	712	2.67
Total for diseases and injuries	375,197	1,280.19	4,334	14.79	2,880	9.83	341,189	1,280.37	3,928	14.74	2,580	9.68

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade 1889-1898.	Colored troops.						Indian troops.					
Mean strength	2,433						227					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever												
Measles	82	3.37					8	3.52				
Smallpox	4	.16										
Vaccinia	621	25.52					226	99.56				
Influenza	1,914	78.66			4	0.16	79	34.81				
Dengue	3	.12										
Mumps	200	8.22					42	18.50				
Diphtheria	20	.82										
Typhoid fever	158	6.49			30	1.23	1	.44				
Yellow fever	197	8.10			25	1.03						
Cerebro spinal fever	2	.08										
Malarial fever, intermittent	2,424	99.62					66	29.08				
Malarial fever, remittent	713	29.30			9	.37	4	1.76				
Malarial fever, pernicious	19	.78			11	.45						
Malarial cachexia	310	12.74										
Fever, undetermined	324	13.31					13	5.73				
Erysipelas	18	.74			4	.16	13	5.73				
Septicæmia and tetanus	1	.04			1	.04						
Rheumatic fever	131	5.38	2	0.08	1	.04	9	3.96	1	0.44		
Consumption	79	3.25	39	1.60	21	.86	54	23.79	26	11.41	16	7.04
Cancer	5	.21	1	.04	2	.08						
Syphilis and results	406	16.69	49	2.01	1	.04	33	14.54	6	2.64		
Gonorrhea and results	1,042	42.83	2	.08			149	65.64				
Chancroid and results	425	17.47					26	11.45				
Infections, other	30	1.23	1	.04	2	.08	21	9.25	2	.88		
Total infectious diseases	9,128	375.15	94	3.86	111	4.56	744	327.75	35	15.37	16	7.04
Anemia	10	.41	2	.08								
Nutrition, others	25	1.03	9	.37	1	.04	1	.44				
Total diseases of nutrition	35	1.44	11	.45	1	.04	1	.44				

TABLE III—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade 1889-1898.	Colored troops.						Indian troops.					
Mean strength	2,433						227					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	198	4.19	1	0.04	......	......	10	4.41	......	......	......	......
Brain and spinal cord	125	5.14	12	.49	5	0.21	3	1.32	1	0.44	1	0.44
Insanity	20	.82	14	.58	1	.04	......	......	......	......	......	......
Meningitis	1	.04	......	......	1	.04	......	......	......	......	......	......
Poisoning, narcotic	5	.21	1	.04	......	......	1	.44	......	......	......	......
Nervous system, others	1,031	42.37	6	.25	1	.04	71	31.28	2	.88	......	......
Total diseases of the nervous system	1,301	53.47	34	1.40	8	.33	85	37.45	3	1.32	1	.44
Poisoning, irritant	10	.41	......	......	2	.08	......	......	......	......	......	......
Tonsillitis, pharyngitis, and sore throat	2,094	86.02	......	......	......	......	121	53.30	......	......	......	......
Peritonitis	2	.08	......	......	......	......	......	......	......	......	......	......
Dyspepsia, colic, and constipation	1,765	72.54	4	.16	......	......	132	58.15	......	......	......	......
Gastritis	66	2.71	2	.08	1	.04	3	1.32	......	......	......	......
Diarrheal diseases, others	2,152	88.44	2	.08	5	.21	97	42.74	......	......	......	......
Enteritis	38	1.56	......	......	1	.04	1	.44	......	......	......	......
Perityphlitis and appendicitis	19	.78	......	......	2	.08	......	......	......	......	......	......
Digestive system, others	881	36.21	6	.25	4	.16	33	14.54	......	......	......	......
Total diseases of the digestive system	7,027	288.80	14	.58	15	.62	387	170.50				
Heart, diseases of	96	3.95	23	.95	7	.29	5	2.20	2	.88	1	.44
Arteries and veins	14	.58	......	......	8	.33	......	......	......	......	......	......
Total diseases of the circulatory system	110	4.52	23	.95	15	.62	5	2.20	2	.88	1	.44
Bronchitis	1,848	75.95	2	.08	......	......	121	53.30	......	......	......	......
Pneumonia	130	5.34	1	.04	18	.74	22	9.69	......	......	2	.88
Pleurisy	64	2.63	1	.04	1	.04	5	2.20	2	.88	......	......
Respiratory system, others	670	27.54	1	.04	5	.21	48	21.15	1	.44	......	......
Total diseases of the respiratory system	2,712	111.46	5	.21	24	.99	196	86.34	3	1.32	2	.88

Kidneys, diseases of	52	2.14	5	.21	7	.29	......	......	......	......	......	......
Varicocele	18	.74	1	.04	......	......	......	......	......	......	......	......
Genito-urinary, others	250	10.27	8	.33	......	......	16	7.05	1	.44	......	......
Total diseases of the genito-urinary system	320	13.15	14	.58	7	.29	16	7.05	1	.44	......	......
Adenitis	104	4.27	......	......	......	......	21	9.25	......	......	......	......
Lymphatic system, others	14	.58	......	......	......	......	3	1.32	......	......	......	......
Total diseases of the lymphatic system	118	4.85	......	......	......	......	24	10.57	......	......	......	......
Rheumatism, muscular	1,810	74.39	14	.58	......	......	81	35.69	......	......	......	......
Osteitis and periostitis	23	.95	6	.25	......	......	1	.44	1	.44	......	......
Arthritis and synovitis	132	5.43	9	.37	......	......	3	1.32	......	......	......	......
Rheumatism, chronic articular	522	21.45	20	.82	......	......	18	7.93	2	.88	......	......
Muscles, bones, and joints, others	63	2.59	6	.25	1	.04	5	2.20	1	.44	......	......
Total diseases of the muscles, bones, and joints	2,550	104.80	55	2.26	1	.04	108	47.57	4	1.76	......	......
Total diseases of the integumentary system	1,026	42.16	5	.21	2	.08	155	68.29	......	......	......	......
Total diseases of the eye	584	24.00	18	.74	......	......	132	58.15	1	.44	......	......
Total diseases of the ear	80	3.29	4	.16	......	......	18	7.93	......	......	1	.44
Total diseases of the nose	27	1.11	2	.08	......	......	4	1.76	......	......	......	......
Total unclassified and undiagnosed	135	5.55	......	......	2	.08	14	6.17	......	......	1	.44
Total for diseases	25,153	1,033.74	279	11.47	186	7.65	1,889	832.16	49	21.57	22	9.68
Drowning	......	......	......		10	.41	......	......	......	......	1	.44
Exhaustion from exposure and fatigue	24	.99	......	......	......	......	......	......	......	......	......	......
Heat stroke	29	1.19	1	.04	1	.04	......	......	......	......	......	......
Lightning stroke	1	.04	......	......	......	......	......	......	......	......	......	......
Venomous bites, stings, and wounds	44	1.81	......	......	......	......	3	1.32	......	......	......	......
Abrasions, blisters, burns, and scalds	274	11.26	......	......	......	......	60	26.43	......	......	......	......
Compression and concussion of brain	19	.78	......	......	2	.08	......	......	......	......	......	......
Contusions and sprains	3,010	123.71	8	.33	1	.04	274	120.71	......	......	......	......
Dislocations	44	1.81	4	.16	......	......	13	5.73	......	......	......	......
Fractures (not shot)	131	5.38	8	.33	4	.16	25	11.01	......	......	4	1.76
Hernia	64	2.63	19	.78	......	......	3	1.32	3	1.32	......	......
Wounds, contused, lacerated, and punctured	964	39.62	4	.16	......	......	140	61.67	......	......	......	......
Wounds, incised	414	17.01	......	......	3	.12	54	23.79	......	......	......	......
Wounds, gunshot	365	15.00	14	.58	53	2.18	15	6.61	2	.88	11	4.84
Secondary results of injury	76	3.12	5	.21	......	......	4	1.76	1	.44	......	......
Other injuries	864	35.51	9	.37	2	.08	52	22.91	......	......	......	......
Total for injuries	6,323	259.86	72	2.96	76	3.12	643	283.28	6	2.64	16	7.04
Total for diseases and injuries	31,476	1,293.60	351	14.43	262	10.77	2,532	1,115.42	55	24.21	38	16.72

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered.*

[All the Volunteer troops in service during the year were on duty in the Division of the Philippines.]

Year 1900.	Pacific islands, Volunteers.						Pacific islands, Regulars.						Pacific islands, total.					
Mean strength	31,434						35,448						66,882					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.03					1	0.03					2	0.03				
Measles	257	8.18			5	0.16	57	1.61			1	0.03	314	4.69			6	0.09
Smallpox	166	5.28			90	2.86	80	2.26			23	.65	246	3.68			113	1.69
Vaccinia	328	10.43					290	8.18					618	9.24				
Influenza	261	8.30					168	4.74					429	6.41				
Dengue	1,821	57.93					1,458	41.13					3,279	49.03				
Mumps	301	9.58					109	3.08					410	6.13				
Diphtheria	11	.35			2	.06	14	.39			2	.06	25	.37			4	.06
Typhoid fever	443	14.09	1	0.03	104	3.31	273	7.70			37	1.04	716	10.71	1	0.01	141	2.11
Cerebro spinal fever	6	.19			5	.16	3	.08			3	.08	9	.13			8	.12
Malarial fever, intermittent	28,144	895.34					19,866	560.43	2	0.06			48,010	717.83	2	.03		
Malarial fever, remittent	4,915	156.37			11	.35	5,355	151.07			13	.37	10,270	153.56			24	.36
Malarial fever, pernicious	111	3.53			42	1.34	79	2.23			40	1.13	190	2.84			82	1.23
Malarial cachexia	1,682	53.51	9	.29	9	.29	1,031	29.09	20	.56	5	.14	2,713	40.56	29	.43	14	.21
Fever, undetermined	869	27.65					1,071	30.22			1	.03	1,940	29.01			1	.01
Erysipelas	20	.64			1	.03	29	.82					49	.72			1	.01
Septicæmia and tetanus	11	.35			7	.22	13	.37			10	.28	24	.36			17	.25
Rheumatic fever	153	4.87					160	4.51	2	.06	1	.03	313	4.68	2	.03	1	.01
Consumption	160	5.09	21	.67	44	1.40	167	4.71	37	1.04	35	.99	327	4.89	58	.87	79	1.18
Cancer	4	.13					3	.08					7	.10				
Syphilis and results	316	10.05	11	.35	2	.06	523	14.75	26	.73	2	.06	839	12.54	37	.55	4	.06
Gonorrhea and results	1,439	45.78	1	.03			2,753	77.67	8	.23			4,192	62.68	9	.13		
Chancroid and results	758	24.11	1	.03	1	.03	1,647	46.46					2,405	35.96	1	.01	1	.01
Infections, other	39	1.24	1	.03	1	.03	63	1.78	4	.11	3	.08	102	1.53	5	.07	4	.06
Total infectious diseases	42,216	1,343.00	45	1.43	324	10.31	35,213	993.37	99	2.79	176	4.97	77,429	1,157.69	144	2.15	500	7.48
Anemia	241	7.67			3	.10	203	5.73	3	.08	2	.06	444	6.64	3	.04	5	.07
Nutrition, others	19	.60	3	.10	1	.03	62	1.75	1	.03			81	1.21	4	.06	1	.01
Total diseases of nutrition	260	8.27	3	.10	4	.13	265	7.48	4	.11	2	.06	525	7.85	7	.10	6	.09

Alcoholism	273	8.68	1	.03	6	.19	440	12.41	4	.11	7	.20	713	10.66	5	.07	13	.19
Brain and spinal cord	126	4.01	18	.57	4	.13	162	4.57	37	1.04	7	.20	288	4.31	55	.82	11	.16
Insanity	123	3.91	39	1.24	1	.03	99	2.79	66	1.86	2	.06	222	3.32	105	1.57	3	.04
Meningitis	12	.38	1	.03	3	.10	10	.28	......	......	1	.03	22	.33	1	.01	4	.06
Poisoning, narcotic	14	.45	......	......	3	.10	31	.96	1	.03	2	.06	48	.72	1	.01	5	.07
Nervous system, others	689	21.92	14	.45	1	.03	963	27.17	26	.73	3	.08	1,652	24.70	40	.60	4	.06
Total diseases of the nervous system	1,237	39.35	73	2.32	18	.57	1,708	48.18	134	3.78	22	.62	2,945	44.03	207	3.10	40	.60
Poisoning, irritant	17	.54	......	......	......	......	122	3.44	1	.03	1	.03	139	2.08	1	.01	1	.01
Tonsillitis, pharyngitis, and sore throat	698	22.21	......	......	......	......	680	19.18	......	......	......	......	1,378	20.60	......	......	......	......
Peritonitis	11	.35	......	......	8	.25	12	.34	......	......	3	.08	23	.34	......	......	11	.16
Dyspepsia, colic, and constipation	2,813	89.49	2	.06	......	......	3,019	85.17	3	.08	......	......	5,832	87.20	5	.07	......	......
Gastritis	1,546	49.18	5	.16	2	.06	1,516	42.77	12	.34	1	.03	3,062	45.78	17	.25	3	.04
Dysentery, acute	2,941	93.56	......	......	136	4.33	2,652	74.82	5	.14	69	1.95	5,593	83.62	5	.07	205	3.07
Dysentery, chronic	1,621	51.57	25	.80	154	4.90	1,377	38.85	64	1.81	165	4.65	2,998	44.83	89	1.33	319	4.77
Diarrheal diseases, others	18,575	590.92	16	.51	52	1.65	13,278	374.58	34	.96	31	.87	31,853	476.26	50	.75	83	1.24
Enteritis	432	13.74	9	.29	9	.29	950	26.80	5	.14	18	.51	1,382	20.66	14	.21	27	.40
Perityphlitis and appendicitis	80	2.55	1	.03	9	.29	86	2.43	6	.17	5	.14	166	2.48	7	.10	14	.21
Digestive system, others	1,615	51.38	7	.22	11	.35	1,663	46.92	26	.73	20	.56	3,278	49.02	33	.49	31	.46
Total diseases of the digestive system	30,349	965.48	65	2.07	381	12.12	25,355	715.27	156	4.40	313	8.83	55,704	832.87	221	3.30	694	10.38
Heart, diseases of	144	4.58	10	.32	6	.19	196	5.53	32	.90	23	.65	340	5.08	42	.63	29	.43
Arteries and veins	72	2.29	5	.16	1	.03	90	2.54	14	.39	2	.06	162	2.42	19	.28	3	.04
Total diseases of the circulatory system	216	6.87	15	.48	7	.22	286	8.07	46	1.30	25	.71	502	7.51	61	.91	32	.48
Bronchitis	1,402	44.60	3	.10	......	......	1,226	34.59	3	.08	......	......	2,628	39.29	6	.09	......	......
Pneumonia	82	2.61	1	.03	24	.76	75	2.12	1	.03	9	.25	157	2.35	2	.03	33	.49
Pleurisy	120	3.82	5	.16	3	.10	155	4.37	9	.25	2	.06	275	4.11	14	.21	5	.07
Respiratory system, others	555	17.66	5	.16	5	.16	494	13.94	8	.23	1	.03	1,049	15.68	13	.19	6	.09
Total diseases of the respiratory system	2,159	68.69	14	.45	32	1.02	1,950	55.01	21	.59	12	.34	4,109	61.44	35	.52	44	.66
Kidneys, diseases of	122	3.88	5	.16	17	.54	131	3.70	10	.28	19	.54	253	3.78	15	.22	36	.54
Varicocele	111	3.53	......	......	......	......	155	4.37	2	.06	......	......	266	3.98	2	.03	......	......
Genito-urinary, others	376	11.96	1	.03	1	.03	395	11.14	4	.11	......	......	771	11.53	5	.07	1	.01
Total diseases of the genito-urinary system	609	19.37	6	.19	18	.57	681	19.21	16	.45	19	.54	1,290	19.29	22	.33	37	.55
Adenitis	200	6.36	......	......	......	......	337	9.51	3	.08	......	......	537	8.03	3	.04	......	......
Lymphatic system, others	34	1.08	2	.06	......	......	35	.99	1	.03	......	......	69	1.03	3	.04	......	......
Total diseases of the lymphatic system	234	7.44	2	.06	......	......	372	10.50	4	.11	......	......	606	9.06	6	.09	......	......
Rheumatism, muscular	1,120	35.63	4	.13	......	......	1,387	39.13	10	.28	......	......	2,507	37.49	14	.21	......	......
Osteitis and periostitis	65	2.07	1	.03	......	......	59	1.66	2	.06	......	......	124	1.85	3	.04	......	......
Arthritis and synovitis	248	7.89	5	.16	......	......	324	9.14	8	.23	1	.03	572	8.55	13	.19	1	.01

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Pacific islands, Volunteers.						Pacific islands, Regulars.						Pacific islands, total.					
Mean strength	31,434						35,448						66,882					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Rheumatism, chronic articular	186	5.92	19	0.60	......	......	269	7.59	25	0.71	......	......	455	6.80	44	0.66	......	......
Muscles, bones, and joints, others	75	2.39	12	.38	......	......	194	5.47	14	.39	......	......	269	4.02	26	.39	......	......
Total diseases of the muscles, bones, and joints	1,694	53.89	41	1.30	......	......	2,233	63	59	1.66	1	.03	3,927	58.72	100	1.50	1	0.01
Total diseases of the integumentary system	6,374	202.78	......	......	......	......	8,237	232.36	......	......	1	.03	14,611	218.46	......	......	1	.01
Total diseases of the eye	446	14.19	20	.64	......	......	588	16.59	21	.59	......	......	1,034	15.46	41	.61	......	......
Total diseases of the ear	585	18.61	35	1.11	......	......	705	19.89	42	1.18	......	......	1,290	19.29	77	1.15	......	......
Total diseases of the nose	23	.73	2	.06	......	......	35	.99	2	.06	......	......	58	.87	4	.06	......	......
Total unclassified and undiagnosed	412	13.11	......	......	......	......	277	7.81	......	......	......	......	689	10.30	......	......	......	......
Total for diseases	86,814	2,761.79	321	10.21	784	24.94	77,905	2,197.73	604	17.04	571	16.11	164,719	2,462.83	925	13.83	13.55	20.26
Drowning	......	......	......	......	39	1.24	5	.14	......	......	37	1.04	5	.07	......	......	76	1.14
Exhaustion from exposure and fatigue	400	12.43	......	......	......	......	193	5.44	2	.06	1	.03	593	8.87	2	.03	1	.01
Heat stroke	66	2.10	1	.03	4	.13	71	2	5	.14	2	.06	137	2.05	6	.09	6	.09
Lightning stroke	1	.03	......	......	......	......	2	.06	......	......	......	......	3	.04	......	......	......	......
Venomous bites, stings, and wounds	258	8.21	1	.03	......	......	318	8.97	......	......	......	......	576	8.61	1	.01	......	......
Abrasions, blisters, burns, and scalds	990	31.50	......	......	......	......	760	21.44	......	......	1	.03	1,750	26.17	......	......	1	.01
Compression and concussion of brain	8	.25	......	......	1	.03	11	.31	2	.06	2	.06	19	.28	2	.03	3	.04
Contusions and sprains	1,440	45.81	1	.03	......	......	1,811	51.09	......	......	......	......	3,251	48.61	1	.01	......	......
Dislocations	51	1.62	......	......	......	......	89	2.51	4	.11	......	......	140	2.09	4	.06	......	......
Fractures (not shot)	160	5.09	5	.16	4	.13	180	5.08	8	.23	4	.11	340	5.08	13	.19	8	.12
Hernia	246	7.83	24	.76	......	......	195	5.50	31	.87	......	......	441	6.59	55	.82	......	......
Wounds, contused, lacerated, and punctured	498	15.84	......	......	1	.03	633	17.86	2	.06	2	.06	1,131	16.91	2	.03	3	.04
Wounds, incised	402	12.79	3	.10	45	1.43	371	10.47	3	.08	10	.28	773	11.56	6	.09	55	.82
Wounds, gunshot	609	19.37	50	1.59	255	8.11	284	8.01	119	3.36	150	4.23	893	13.35	169	2.53	405	6.06
Secondary results of injury	71	2.26	......	......	......	......	180	5.08	14	.39	......	......	251	3.75	14	.21	......	......
Other injuries	88	2.80	2	.06	5	.16	252	7.11	2	.06	5	.14	340	5.08	4	.06	10	.15
Total for injuries	5,288	168.23	87	2.77	354	11.26	5,355	151.06	192	5.42	214	6.04	10,643	159.13	279	4.17	568	8.49
Totals for diseases and injuries	92,102	2,930.01	408	12.98	1,138	36.20	83,260	2,348.79	796	22.46	785	22.15	175,362	2,621.96	1,204	18	1,923	28.75

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Cuba.						Porto Rico.						China.					
Mean strength	8,690						2,180						1,947					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever																		
Measles	9	1.04					7	3.21					3	1.54				
Smallpox																		
Vaccinia	67	7.71					2	.92					23	11.81				
Influenza	60	6.90					36	16.51					63	32.36				
Dengue							23	10.55					1	.51				
Mumps	22	2.53					3	1.38					6	3.08				
Diphtheria	1	.12											1	.51				
Typhoid fever	41	4.72			8	0.92	48	22.02			3	1.38	54	27.73			3	1.54
Yellow fever	144	16.57			32	3.68												
Cerebro spinal fever	1	.12			1	.12							1	.51			1	.51
Malarial fever, intermittent	3,863	444.53					279	127.98					617	316.90				
Malarial fever, remittent	1,044	120.14					240	110.09					47	24.14				
Malarial fever, pernicious	22	2.53			9	1.04	2	.92			1	.46	2	1.03	1	0.51	1	.51
Malarial cachexia	123	14.15					18	8.26	1	0.46			48	24.65	3	1.54		
Fever, undetermined	29	3.34					2	.92					52	26.71				
Erysipelas	3	.35					2	.92										
Septicæmia and tetanus	1	.12			2	.23	1	.46			1	.46						
Rheumatic fever	18	2.07					8	3.67					11	5.65				
Consumption	33	3.80	13	1.50	1	.12	10	4.59	5	2.29			15	7.70	5	2.57	3	1.54
Cancer	2	.23					2	.92			1	.46						
Syphilis and results	230	26.47	22	2.53			96	44.03	2	.92			18	9.24				
Gonorrhea and results	972	111.85	13	1.50			423	194.04	2	.92			193	99.13				
Chancroid and results	455	52.36					283	129.81					127	65.23				
Infections, other	4	.46					11	5.05					1	.51				
Total infectious diseases	7,144	822.09	48	5.52	53	6.10	1,496	686.24	10	4.59	6	2.75	1,283	658.96	9	4.62	8	4.11
Anæmia	21	2.42	1	.12			5	2.29					4	2.05				
Nutrition, others	8	.92	3	.35			3	1.38					1	.51				
Total diseases of nutrition	29	3.34	4	.46			8	3.67					5	2.57				
Alcoholism	256	29.46	1	.12	2	.23	92	42.20	1	.46			15	7.70				
Brain and spinal cord	23	2.65	5	.58			3	1.38					5	2.57	2	1.03	1	.51

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Cuba.						Porto Rico.						China.					
Mean strength	8,690						2,180						1,947					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number,	Ratio.	Number.	Ratio.
Insanity	14	1.61	10	1.15			3	1.38	4	1.83			7	3.60				
Meningitis							1	.46										
Poisoning, narcotic	2	.23	1	.12			3	1.38			1	0.46	1	.51				
Nervous system, others	231	26.58	4	.46	1	0.12	57	26.15					65	33.38	2	1.03		
Total diseases of the nervous system	526	60.53	21	2.42	3	.35	159	72.94	5	2.29	1	.46	93	47.77	4	2.05	1	0.51
Poisoning, irritant	28	3.22	1	.12			54	24.77										
Tonsillitis, pharyngitis, and sore throat	234	26.93					41	18.81					80	41.09				
Peritonitis	2	.23			1	.12							1	.51			1	.51
Dyspepsia, colic, and constipation	603	69.39	1	.12			105	48.17					101	51.87				
Gastritis	174	20.02	1	.12	1	.12	38	17.43					101	51.87	1	.51		
Dysentery, acute	266	30.61	1	.12	5	.58	60	27.52			1	.46	342	175.64	1	.51	18	9.24
Dysentery, chronic	21	2.42	1	.12			3	1.38			1	.46	96	49.30	4	2.05	13	6.68
Diarrheal diseases, others	1,162	133.72	1	.12			260	119.27	5	2.29			2,028	1,041.60	1	.51		
Enteritis	55	6.33					9	4.13			1	.46	54	27.73	2	1.03	1	.51
Perityphlitis and appendicitis	26	2.99			2	.23	3	1.38	1	.46			4	2.05			1	.51
Digestive system, others	305	35.10			2	.23	76	34.86					92	47.25	2	1.03	1	.51
Total diseases of the digestive system	2,876	330.96	6	.69	11	1.27	649	297.71	6	2.75	3	1.38	2,899	1,488.96	11	5.65	35	17.98
Heart, diseases of	49	5.64	7	.81	1	.12	6	2.75					7	3.60	1	.51		
Arteries and veins	12	1.38	1	.12	1	.12	3	1.38					5	2.57				
Total diseases of the circulatory system	61	7.02	8	.93	2	.23	9	4.13					12	6.16	1	.51		
Bronchitis	255	29.34	1	.12			65	29.82					180	92.45				
Pneumonia	14	1.61					5	2.29					6	3.08				
Pleurisy	22	2.53			1	.12	6	2.75					14	7.19	1	.51		
Respiratory system, others	186	21.40			1	.12	24	11.01					65	33.38	3	1.54		
Total diseases of the respiratory system	477	54.89	1	.12	2	.23	100	45.87					265	136.11	4	2.05		

Kidneys, diseases of	33	3.80	1	.12	2	.23	3	1.38					3	1.54			1	.51
Varicocele	54	6.21	2	.23			2	.92	1	.46			2	1.03	1	.51		
Genito-urinary, others	138	15.88	1	.12			18	8.26					12	6.16				
Total diseases of the genito-urinary system	225	25.89	4	.46	2	.23	23	10.55	1	.46			17	8.73	1	.51	1	.51
Adenitis	54	6.21					44	20.18					7	3.60				
Lymphatic system, others	9	1.04					5	2.29			1	.46	2	1.03				
Total diseases of the lymphatic system	63	7.25					49	22.48			1	.46	9	4.62				
Rheumatism, muscular	300	34.52					56	25.69	1	.46			81	41.60				
Osteitis and periostitis	20	2.30	2	.23			5	2.29	1	.46			6	3.08				
Arthritis and synovitis	85	9.78	2	.23			23	10.55					28	14.38				
Rheumatism, chronic articular	54	6.21	5	.58			5	2.29	2	.92			19	9.76	1	.51		
Muscles, bones, and joints, others	63	7.25	2	.23			10	4.59	1	.46			10	5.14				
Total diseases of the muscles, bones, and joints	522	60.07	11	1.27			99	45.41	5	2.29			144	73.96	1	.51		
Total diseases of the integumentary system	1,621	186.53	3	.35			413	189.45	1	.46			338	173.59				
Total diseases of the eye	136	15.65	5	.58			29	13.30	1	.46			21	10.79	3	1.54		
Total diseases of the ear	72	8.29	4	.46			10	4.59					15	7.70	1	.51		
Total diseases of the nose	11	1.27					2	.92	1	.46			3	1.54				
Total unclassified and undiagnosed	21	2.42					1	.46					8	4.11			1	.51
Total for diseases	13,784	1,586.19	115	13.23	73	8.40	3,047	1,397.71	30	13.76	11	5.05	5,112	2,625.58	35	17.98	46	23.62
Drowning	1	.12			1	.12											1	.51
Exhaustion from exposure and fatigue	14	1.61					3	1.38					97	49.82			1	.51
Heat stroke	6	.69											38	19.52			3	1.54
Lightning stroke							1	.46										
Venomous bites, stings, and wounds	101	11.62			1	.12	20	9.17					51	26.19				
Abrasions, blisters, burns, and scalds	229	26.35					20	9.17					43	22.08				
Compression and concussion of brain	8	.92																
Contusions and sprains	1,249	143.72	1	.12			24	11.01					100	51.36				
Dislocations	35	4.03	1	.12			1	.46					3	1.54				
Fractures (not shot)	96	11.05	5	.58	2	.23	16	7.34					18	9.24	1	.51		
Hernia	46	5.29	12	1.38			3	1.38	1	.46			9	4.62				
Wounds, contused, lacerated, and punctured	366	42.12	1	.12			42	19.27					36	18.49				
Wounds, incised	149	17.15			1	.12	16	7.34					15	7.70				
Wounds, gunshot	29	3.34	5	.58	3	.35	12	5.50	1	.46			182	93.47	38	19.52	42	21.57
Secondary results of injury	37	4.26	3	.35	2	.23	20	9.17					12	6.16	1	.51		
Other injuries	127	14.61	1	.12	2	.23	28	12.84	1	.46			23	11.81				
Total for injuries	2,493	286.88	29	3.34	12	1.38	393	180.27	3	1.38			627	322.03	40	20.54	47	24.14
Total for diseases and injuries	16,277	1,873.07	144	16.57	85	9.78	3,440	1,577.98	33	15.14	11	5.05	5,739	2,947.61	75	38.52	93	47.76

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Total islands and China.						United States (continental).					
Mean strength	79,699						20,690					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	2	0.03	....	....	....	....	4	0.19	....	....	1	0.05
Measles	333	4.18	....	....	6	0.08	235	11.36	....	....	1	.05
Smallpox	246	3.09	....	....	113	1.42	15	.72	....	....	1	.05
Vaccinia	710	8.91	....	....	....	....	1,326	64.09	....	....	....	....
Influenza	588	7.38	....	....	....	....	1,044	50.46	....	....	1	.05
Dengue	3,303	41.44	....	....	....	....	18	.87	....	....	....	....
Mumps	441	5.53	....	....	....	....	128	6.19	....	....	....	....
Diphtheria	27	.34	....	....	4	.05	18	.87	....	....	....	....
Typhoid fever	859	10.78	1	0.01	155	1.94	115	5.56	2	0.10	9	.43
Yellow fever	144	1.81	....	....	32	.40	4	.19	....	....	....	....
Cerebro spinal fever	11	.14	....	....	10	.13	....	....	....	....	....	....
Malarial fever, intermittent	52,769	662.10	2	.03	....	....	3,045	147.16	....	....	....	....
Malarial fever, remittent	11,601	145.56	....	....	24	.30	230	11.12	....	....	1	.05
Malarial fever, pernicious	216	2.71	1	.01	93	1.17	4	.19	....	....	3	.14
Malarial cachexia	2,902	36.41	33	.41	14	.18	160	7.73	7	.34	1	.05
Fever, undetermined	2,023	25.38	....	....	1	.01	200	9.67	....	....	1	.05
Erysipelas	54	.68	....	....	1	.01	51	2.46	....	....	....	....
Septicæmia and tetanus	26	.33	....	....	20	.25	6	.29	1	.05	....	....
Rheumatic fever	350	4.39	2	.03	1	.01	83	4.01	....	....	....	....
Consumption	385	4.83	81	1.02	83	1.04	109	5.27	56	2.71	13	.63
Cancer	11	.14	....	....	1	.01	5	.24	3	.14	....	....
Syphilis and results	1,183	14.84	61	.77	4	.05	406	19.62	113	5.46	1	.05
Gonorrhea and results	5,780	72.52	24	.30	....	....	2,119	102.42	34	1.64	....	....
Chancroid and results	3,270	41.03	1	.01	1	.01	690	33.35	4	.19	....	....
Infections, other	118	1.48	5	.06	4	.05	35	1.69	4	.19	2	.10
Total infectious diseases	87,352	1,096.02	211	2.65	567	7.11	10,050	485.74	224	10.83	35	1.69
Anemia	474	5.95	4	.05	5	.06	22	1.06	....	....	1	.05
Nutrition, others	93	1.17	7	.09	1	.01	21	1.01	49	2.37	....	....
Total diseases of nutrition	567	7.11	11	.14	6	.08	43	2.08	49	2.37	1	.05
Alcoholism	1,076	13.50	7	.09	15	.19	464	22.43	6	.29	3	.14
Brain and spinal cord	319	4.00	62	.78	12	.15	76	3.67	37	1.79	5	.24

Insanity	246	3.09	119	1.49	3	.04	27	1.30	30	1.45	......	......
Meningitis	23	.29	1	.01	4	.05	3	.14	......	......	1	.05
Poisoning, narcotic	54	.68	2	.03	6	.08	20	.97	5	.24	3	.14
Nervous system, others	2,005	25.16	46	.58	5	.06	634	30.64	19	.92	......	......
Total diseases of the nervous system	3,723	46.73	237	2.97	45	.56	1,224	59.16	97	4.69	12	.58
Poisoning, irritant	221	2.77	2	.03	1	.01	64	3.09	......	......	2	.10
Tonsillitis, pharyngitis, and sore throat	1,733	21.74	......	......	......	......	1,787	86.37	......	......	......	......
Peritonitis	26	.33	......	......	13	.16	3	.14	......	......	2	.10
Dyspepsia, colic, and constipation	6,641	83.32	6	.08	......	......	2,059	99.51	1	.05	......	......
Gastritis	3,375	42.35	19	.24	4	.05	236	11.41	1	.05	......	......
Dysentery, acute	6,261	78.56	7	.09	229	2.87	78	3.77	......	......	......	......
Dysentery, chronic	3,118	39.15	94	1.18	333	4.18	62	3.00	17	.82	3	.14
Diarrheal diseases, others	35,303	442.96	57	.72	83	1.04	1,858	89.80	6	.29	1	.05
Enteritis	1,500	18.82	16	.20	29	.36	98	4.74	2	.10	......	......
Perityphlitis and appendicitis	199	2.50	8	.10	17	.21	60	2.90	1	.05	3	.14
Digestive system, others	3,751	47.07	35	.44	34	.43	710	34.32	19	.92	4	.19
Total diseases of the digestive system	62,128	779.53	2.44	3.06	743	9.32	7,015	339.05	47	2.27	15	.72
Heart, diseases of	402	5.04	50	.63	30	.38	122	5.90	35	1.69	13	.63
Arteries and veins	182	2.28	20	.25	4	.05	34	1.64	12	.58	3	.14
Total diseases of the circulatory system	584	7.33	70	.88	34	.43	156	7.54	47	2.27	16	.77
Bronchitis	3,128	39.25	7	.09	......	......	1,746	84.39	5	.24	......	......
Pneumonia	182	2.28	2	.03	33	.41	88	4.25	......	......	7	.34
Pleurisy	317	3.98	15	.19	6	.08	92	4.45	5	.24	1	.05
Respiratory system, others	1,324	16.61	16	.20	7	.09	801	38.72	9	.43	2	.10
Total diseases of the respiratory system	4,951	62.12	40	.50	46	.58	2,727	131.80	19	.92	10	.48
Kidneys, diseases of	292	3.66	16	.20	39	.49	78	3.77	16	.77	8	.39
Varicocele	324	4.07	6	.08	......	......	68	3.29	15	.73	......	......
Genito-urinary, others	939	11.78	6	.08	1	.01	229	11.07	16	.77	......	......
Total diseases of the genito-urinary system	1,555	19.51	28	.35	40	.50	375	18.12	47	2.27	8	.39
Adenitis	642	8.06	3	.04	......	......	100	4.83	2	.10	......	......
Lymphatic system, others	85	1.07	3	.04	1	.01	12	.58	......	......	......	......
Total diseases of the lymphatic system	727	9.12	6	.08	1	.01	112	5.41	2	.10	......	......
Rheumatism, muscular	2,944	36.94	15	.19	......	......	1,045	50.51	7	.34	......	......
Osteitis and periostitis	155	1.94	6	.08	......	......	38	1.84	2	.10	......	......
Arthritis and synovitis	708	8.88	15	.19	1	.01	224	10.83	11	.53	......	......
Rheumatism, chronic articular	533	6.69	52	.65	......	......	143	6.91	14	.68	......	......
Muscles, bones, and joints, others	352	4.42	29	.36	......	......	100	4.83	21	1.01	......	......
Total diseases of the muscles, bones, and joints	4,692	58.87	117	1.47	1	.01	1,550	74.92	55	2.66	......	......

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Total islands and China.						United States (continental).					
Mean strength	79,699						20,690					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	16,983	213.09	4	0.05	1	0.01	1,873	90.53	6	0.29	....	....
Total diseases of the eye	1,220	15.31	50	.63	....	....	308	14.89	45	2.17	....	....
Total diseases of the ear	1,387	17.40	82	1.03	....	....	174	8.41	29	1.40	....	....
Total diseases of the nose	74	.93	5	.06	....	....	33	1.59	6	.29	....	....
Total unclassified and undiagnosed	719	9.02	....	....	1	.01	75	3.62	....	....	3	0.14
Total for diseases	186,662	2,342.09	1,105	13.86	1,485	18.63	25,715	1,242.87	673	32.52	100	4.83
Drowning	6	.08	....	....	78	.98	1	.05	....	....	38	1.84
Exhaustion from exposure and fatigue	707	8.87	2	.03	2	.03	43	2.08	....	....	....	....
Heat stroke	181	2.27	6	.08	9	.11	14	.68	2	.10	....	....
Lightning stroke	4	.05	....	....	....	....	....	....	....	....	....	....
Venomous bites, stings, and wounds	748	9.39	1	.01	1	.01	107	5.17	2	.10	....	....
Abrasions, blisters, burns, and scalds	2,042	25.62	....	....	1	.01	473	22.86	....	....	....	....
Compression and concussion of brain	27	.34	2	.03	3	.04	11	.53	1	.05	1	.05
Contusions and sprains	4,811	60.37	2	.03	....	....	2,761	133.43	2	.10	....	....
Dislocations	179	2.25	5	.06	....	....	88	4.25	4	.19	....	....
Fractures (not shot)	470	5.90	19	.24	10	.13	240	11.60	25	1.21	1	.05
Hernia	499	6.26	68	.85	....	....	93	4.49	34	1.64	....	....
Wounds, contused, lacerated, and punctured	1,575	19.76	3	.04	3	.04	777	37.55	3	.14	2	.10
Wounds, incised	953	11.96	6	.08	56	.70	304	14.69	....	....	2	.10
Wounds, gunshot	1,116	14.00	213	2.67	460	5.77	57	2.75	22	1.06	11	.53
Secondary results of injury	320	4.02	18	.23	2	.03	120	5.80	40	1.93	....	....
Other injuries	518	6.50	6	.08	12	.15	458	22.14	5	.24	6	.29
Total for injuries	14,156	177.62	351	4.40	637	7.99	5,547	268.10	140	6.77	61	2.95
Total for diseases and injuries	200,818	2,519.70	1,456	18.27	2,122	26.63	31,262	1,510.97	813	39.29	161	7.78

TABLE V.—*Armies, Regular and Volunteer, 1900.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service.*

Year 1900.	Infantry.						Cavalry.						Artillery.					
Mean strength	65,688						13,500						11,125					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	4	0.06	......	......	......	......	1	0.07	......	......	1	0.07	......	......	......	......	......	......
Measles	374	5.69	......	......	6	0.09	33	2.44	......	......	......	......	85	7.64	......	......	......	......
Smallpox	226	3.44	......	......	110	1.67	10	.74	......	......	3	.22	5	.45	......	......	......	......
Vaccinia	950	14.46	......	......	......	......	334	24.71	......	......	......	......	352	31.64	......	......	......	......
Influenza	696	10.60	......	......	......	......	280	20.74	......	......	......	......	353	31.73	......	......	......	......
Dengue	2,718	41.38	......	......	......	......	237	17.55	......	......	......	......	154	13.84	......	......	......	......
Mumps	399	6.07	......	......	......	......	47	3.48	......	......	......	......	67	6.02	......	......	......	......
Diphtheria	27	.41	......	......	3	.05	7	.52	......	......	1	.07	8	.72	......	......	......	......
Typhoid fever	690	10.50	2	0.03	138	2.10	132	9.78	......	......	17	1.26	82	7.37	1	0.09	4	0.36
Yellow fever	30	.46	......	......	10	.15	60	4.44	......	......	11	.81	18	1.62	......	......	3	.27
Cerebro spinal fever	10	15	......	......	9	.14	1	.07	......	......	1	.07	......	......	......	......	......	......
Malarial fever, intermittent	43,644	664.41	2	.03	......	......	7,718	571.71	......	......	......	......	2,788	250.61	......	......	......	......
Malarial fever, remittent	9,186	139.84	......	......	18	.27	1,405	104.07	......	......	5	.37	711	63.91	......	......	......	......
Malarial fever, pernicious	187	2.84	1	.02	87	1.32	21	1.56	......	......	5	.37	7	.63	......	......	1	.09
Malarial cachexia	2,543	38.72	31	.47	11	.17	282	20.89	2	0.15	3	.22	135	12.13	5	.45	1	.09
Fever, undetermined	1,887	28.73	......	......	1	.02	143	10.59	......	......	......	......	109	9.80	......	......	1	.09
Erysipelas	55	.84	......	......	1	.02	8	.59	......	......	......	......	18	1.62	......	......	......	......
Septicaemia and tetanus	24	.37	......	......	16	.24	5	.37	1	.07	3	.22	2	.18	......	......	......	......
Rheumatic fever	322	4.90	1	.02	1	.02	54	4.00	1	.07	......	......	25	2.25	......	......	......	......
Consumption	335	5.10	71	1.08	82	1.25	58	4.30	24	1.78	4	.30	54	4.85	24	2.16	8	.72
Cancer	10	.15	1	.02	......	......	1	.07	......	......	1	.07	4	.36	2	.18	......	......
Syphilis and results	974	14.83	75	1.14	2	.03	333	24.67	48	3.56	1	.07	214	19.24	41	3.69	1	.09
Gonorrhea and results	4,624	70.40	15	.23	......	......	1,505	111.48	23	1.70	......	......	1,186	106.61	13	1.17	......	......
Chancroid and results	2,548	38.79	4	.06	1	.02	696	51.56	1	.07	......	......	517	46.47	......	......	......	......
Infections, other	99	1.51	6	.09	4	.06	17	1.26	......	......	1	.07	27	2.43	2	.18	1	.09
Total infectious diseases	72,562	1,104.65	209	3.18	500	7.61	13,388	991.70	100	7.41	57	4.22	6,921	622.11	88	7.92	20	1.80
Anemia	382	5.82	2	.03	5	.08	38	2.81	1	.07	......	......	58	5.21	1	.09	1	.09
Nutrition, others	77	1.17	4	.06	1	.02	16	1.19	10	.74	......	......	9	.81	28	2.52	......	......
Total diseases of nutrition	459	6.99	6	.09	6	.09	54	4.00	11	.81	......	......	67	6.02	29	2.61	1	.09

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Infantry						Cavalry.						Artillery.					
Mean strength	65,688						13,500						11,125					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	923	14.05	8	0.12	14	0.21	182	13.48	1	0.07	2	0.15	311	27.95	1	0.09	2	0.18
Brain and spinal cord	297	4.52	62	.94	13	.20	41	3.04	15	1.11	......	......	28	2.52	13	1.17	1	.09
Insanity	221	3.36	106	1.61	3	.05	23	1.70	21	1.56	......	......	14	1.26	10	.90	......	......
Meningitis	21	.32	1	.02	4	.06	2	.15	......	......	1	.07	3	.27	......	......	......	......
Poisoning, narcotic	39	.59	1	.02	4	.06	13	.96	3	.22	3	.22	8	.72	1	.09	1	.09
Nervous system, others	1,615	24.59	44	.67	4	.06	424	31.41	7	.52	1	.07	348	31.28	10	.90	......	......
Total diseases of the nervous system	3,116	47.44	222	3.38	42	.64	685	50.74	47	3.48	7	.52	712	64	35	3.15	4	.36
Poisoning, irritant	146	2.22	2	.03	1	.02	34	2.52	......	......	......	......	93	8.36	......	......	1	.09
Tonsillitis, pharyngitis, and sore throat	1,874	28.53	......	......	......	......	722	53.48	......	......	......	......	553	49.71	......	......	......	......
Peritonitis	23	.35	......	......	12	.18	3	.22	......	......	1	.07	2	.18	......	......	1	.09
Dyspepsia, colic, and constipation	5,689	86.62	5	.08	......	......	1,262	93.48	2	.15	......	......	1,204	108.23	......	......	......	......
Gastritis	2,826	43.03	19	.29	4	.06	419	31.04	1	.07	......	......	151	13.57	......	......	......	......
Dysentery, acute	5,235	79.70	5	.08	203	3.09	682	50.52	2	.15	16	1.19	217	19.51	......	......	1	.09
Dysentery, chronic	2,675	40.72	88	1.34	301	4.58	283	20.96	10	.74	22	1.63	87	7.82	10	.90	7	.63
Diarrheal diseases, others	29,905	455.26	55	.84	80	1.22	3,886	287.85	6	.44	3	.22	2,363	212.41	......	......	......	......
Enteritis	1,161	17.67	12	.18	26	.40	237	17.55	1	.07	1	.07	110	9.89	2	.18	1	.09
Perityphlitis and appendicitis	166	2.53	6	.09	17	.26	38	2.81	......	......	2	.15	34	3.06	3	.27	......	......
Digestive system, others	3,172	48.29	33	.50	31	.47	619	45.85	3	.22	4	.30	447	40.18	16	1.44	2	.18
Total diseases of the digestive system	52,872	804.90	225	3.43	675	10.28	8,185	606.30	25	1.85	49	3.63	5,261	472.90	31	2.79	13	1.17
Heart, diseases of	349	5.31	47	.72	29	.44	79	5.85	23	1.70	6	.44	46	4.13	7	.63	......	......
Arteries and veins	144	2.19	17	.26	4	.06	28	2.07	2	.15	......	......	23	2.07	5	.45	1	.09
Total diseases of the circulatory system	493	7.51	64	.97	33	.50	107	7.93	25	1.85	6	.44	69	6.20	12	1.08	1	.09
Bronchitis	2,864	43.60	6	.09	......	......	756	56.00	2	.15	......	......	790	71.01	2	.18	......	......
Pneumonia	171	2.60	1	.02	30	.46	47	3.48	......	......	6	.44	25	2.25	1	.09	2	.18
Pleurisy	258	3.93	14	.21	4	.06	66	4.89	4	.30	2	.15	41	3.69	1	.09	......	......
Respiratory system, others	1,295	19.71	16	.24	6	.09	213	15.78	1	.07	1	.07	420	37.75	2	.18	1	.09
Total diseases of the respiratory system	4,588	69.85	37	.56	40	.61	1,082	80.15	7	.52	9	.67	1,276	114.70	6	.54	3	.27

Kidneys, diseases of	238	3.62	19	.29	32	.49	63	4.67	5	.37	7	.52	27	2.43	3	.27	4	.36
Varicocele	218	3.32	2	.03	......	......	90	6.67	4	.30	......	......	58	5.21	8	.72	......	......
Genito-urinary, others	788	12	11	.17	......	......	178	13.18	1	.07	1	.07	142	12.76	6	.54	......	......
Total diseases of the genito-urinary system	1,244	18.94	32	.49	32	.49	331	24.52	10	.74	8	.59	227	20.41	17	1.53	4	.36
Adenitis	491	7.47	2	.03	......	......	149	11.04	......	......	......	......	71	6.38	3	.27	......	......
Lymphatic system, others	68	1.04	3	.05	......	......	15	1.11	......	......	1	.07	11	.99	......	......	......	......
Total diseases of the lymphatic system	559	8.51	5	.08	......	......	164	12.15	......	......	1	.07	82	7.37	3	.27	......	......
Rheumatism, muscular	2,560	38.97	17	.26	......	......	588	43.55	3	.22	......	......	571	51.33	2	.18	......	......
Osteitis and periostitis	140	2.13	2	.03	......	......	30	2.22	3	.22	......	......	10	.90	3	.27	......	......
Arthritis and synovitis	602	9.16	15	.23	1	.02	146	10.81	5	.37	......	......	122	10.97	6	.54	......	......
Rheumatism, chronic articular	459	6.99	44	.67	......	......	99	7.33	10	.74	......	......	54	4.85	8	.72	......	......
Muscles, bones, and joints, others	254	3.87	33	.50	......	......	105	7.78	9	.67	......	......	67	6.02	6	.54	......	......
Total diseases of the muscles, bones, and joints	4,015	61.13	111	1.69	1	.02	968	71.71	30	2.22	......	......	824	74.07	25	2.25	......	......
Total diseases of the integumentary system	13,644	207.71	5	.08	1	.02	2,848	210.96	1	.07	......	......	1,796	161.44	4	.36	......	......
Total diseases of the eye	1,019	15.51	52	.79	......	......	221	16.37	18	1.33	......	......	175	15.73	19	1.71	......	......
Total diseases of the ear	1,111	16.91	78	1.19	......	......	181	13.41	8	.59	......	......	166	14.92	16	1.44	......	......
Total diseases of the nose	59	.90	4	.06	......	......	19	1.41	5	.37	......	......	17	1.53	2	.18	......	......
Total unclassified and undiagnosed	681	10.37	......	......	2	.03	54	4.00	......	......	2	.15	18	1.62	......	......	......	......
Total for diseases	156,422	2,381.29	1,050	15.98	1,332	20.28	28,287	2,095.33	287	21.26	139	10.30	17,611	1,583.01	287	25.80	46	4.13
Drowning	2	.03	......	......	66	1.00	3	.22	......	......	16	1.19	2	.18	......	......	27	2.43
Exhaustion from exposure and fatigue	641	9.76	1	.02	2	.03	47	3.48	......	......	......	......	24	2.16	1	.09	......	......
Heat stroke	136	2.07	5	.08	8	.12	34	2.52	2	.15	1	.07	15	1.35	......	......	......	......
Lightning stroke	4	.06	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Venomous bites, stings, and wounds	610	9.29	1	.02	......	......	112	8.30	......	......	1	.07	81	7.28	1	.09	......	......
Abrasions, blisters, burns, and scalds	1,758	26.76	......	......	......	......	388	28.74	......	......	1	.07	259	23.28	......	......	......	......
Compression and concussion of brain	18	.27	2	.03	3	.05	8	.59	......	......	1	.07	10	.90	1	.09	......	......
Contusions and sprains	3,431	52.23	1	.02	......	......	2,312	171.26	3	.22	......	......	1,429	128.45	......	......	......	......
Dislocations	140	2.13	2	.03	......	......	66	4.89	4	.30	......	......	47	4.22	2	.18	......	......
Fractures (not shot)	353	5.37	17	.26	3	.05	175	12.96	14	1.04	3	.22	119	10.70	9	.81	4	.36
Hernia	418	6.36	61	.93	......	......	90	6.67	22	1.63	......	......	36	3.24	7	.63	......	......
Wounds, contused, lacerated, and punctured	1,240	18.88	3	.05	2	.03	621	46.00	1	.07	......	......	374	33.62	2	.18	2	.18
Wounds, incised	809	12.32	6	.09	54	.82	206	15.26	......	......	1	.07	192	17.26	......	......	......	......
Wounds, gunshot	981	14.93	201	3.06	411	6.26	131	9.70	18	1.33	46	3.41	35	3.15	7	.63	9	.81
Secondary results of injury	259	3.94	23	.35	......	......	82	6.07	12	.89	2	.15	76	6.83	20	1.80	......	......
Other injuries	367	5.59	4	.06	8	.12	299	22.15	4	.30	3	.22	208	18.70	2	.18	1	.09
Total for injuries	11,167	170.00	327	4.98	557	8.48	4,574	338.82	80	5.93	75	5.56	2,907	261.31	52	4.67	43	3.87
Total for diseases and injuries	167,589	2,551.29	1,377	20.96	1,889	28.76	32,861	2,434.15	367	27.19	214	15.85	20,518	1,844.32	339	30.47	89	8.00

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	680						726						711					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	1	1.47					1	1.38					1	1.41				
Smallpox	1	1.47											2	2.81			1	1.41
Vaccinia	15	22.06					13	17.91					5	7.03				
Influenza	7	10.29					54	74.38					19	26.72				
Dengue	3	4.41											19	26.72				
Mumps							1	1.38					2	2.81				
Diphtheria													2	2.81				
Typhoid fever	3	4.41					4	5.51			1	1.38	8	11.25				
Yellow fever													7	9.85			2	2.81
Malarial fever, intermittent	243	357.36					45	61.98					234	329.11				
Malarial fever, remittent	68	100					3	4.13					33	46.41			1	1.41
Malarial fever, pernicious																	1	1.41
Malarial cachexia	9	13.23					2	2.75					10	14.06				
Fever, undetermined	4	5.88					1	1.38					7	9.85				
Erysipelas							3	4.13										
Rheumatic fever							3	4.13					8	11.25				
Consumption	4	5.88	2	2.94	1	1.47							10	14.06	1	1.41	1	1.41
Syphilis and results	9	13.23					1	1.38					6	8.44				
Gonorrhea and results	29	42.65					6	8.26					36	50.63	2	2.81		
Chancroid and results	19	27.94					1	1.38					19	26.72				
Total infectious diseases	415	610.29	2	2.94	1	1.47	138	190.08			1	1.38	428	601.97	3	4.22	6	8.44
Anæmia							1	1.38					3	4.22				
Nutrition, others	1	1.47					1	1.38					1	1.41				
Total diseases of nutrition	1	1.47					2	2.75					4	5.63				
Alcoholism	9	13.23					11	15.15					15	21.10				
Brain and spinal cord	2	2.94					2	2.75			1	1.38	1	1.41				
Insanity	1	1.47											1	1.41				
Poisoning, narcotic	1	1.47																
Nervous system, others	19	27.94					22	30.30					18	25.32	1	1.41		
Total diseases of the nervous system	32	47.06					35	48.21			1	1.38	35	49.24	1	1.41		

Poisoning, irritant	1	1.47	....	....	....	....	1	1.38	....	....	....	....	12	16.88	....	....	....	....
Tonsillitis, pharyngitis, and sore throat	11	16.18	....	....	....	....	32	44.08	....	....	....	....	24	33.75	....	....	....	....
Dyspepsia, colic, and constipation	46	67.65	....	....	....	....	44	60.61	....	....	....	....	17	23.91	....	....	....	....
Gastritis	28	41.18	....	....	....	....	7	9.64	....	....	....	....	34	47.82	....	....	1	1.41
Dysentery, acute	22	32.36	....	....	....	....	1	1.38	....	....	....	....	16	22.50	....	....	1	1.41
Dysentery, chronic	27	39.71	2	2.94	2	2.94	....	....	....	....	....	....	89	125.18	....	....	....	....
Diarrheal diseases, others	184	270.59	....	....	....	....	50	68.87	....	....	....	....	7	9.85	....	....	....	....
Enteritis	11	16.18	....	....	....	....	5	6.89	....	....	....	....	2	2.81	....	....	....	....
Perityphlitis and appendicitis	....	....	....	....	....	....	....	....	....	....	....	....	16	22.50	1	1.41	....	....
Digestive system, others	16	23.53	....	....	....	....	22	30.30	....	....	....	....					....	....
Total diseases of the digestive system	346	508.82	2	2.94	2	2.94	162	223.14	....	....	....	....	217	305.20	1	1.41	2	2.81
Heart, diseases of	13	19.12	1	1.47	1	1.47	3	4.13	....	....	4	5.51	2	2.81	....	....	....	....
Arteries and veins	3	4.41	....	....	....	....	2	2.75	....	....	....	....	....	....	....	....	....	....
Total diseases of the circulatory system	16	23.53	1	1.47	1	1.47	5	6.89	....	....	4	5.51	2	2.81	....	....	....	....
Bronchitis	33	48.53	1	1.47	....	....	35	48.21	....	....	1	1.38	34	47.82	....	....	....	....
Pneumonia	2	2.94	....	....	....	....	2	2.75	....	....	....	....	1	1.41	....	....	....	....
Pleurisy	1	1.47	....	....	....	....	2	2.75	....	....	....	....	6	8.44	....	....	....	....
Respiratory system, others	20	29.41	....	....	....	....	33	45.46	1	1.38	....	....	3	4.22	....	....	....	....
Total diseases of the respiratory system	56	82.35	1	1.47	....	....	72	99.17	1	1.38	1	1.38	44	61.88	....	....	....	....
Kidneys, diseases of	3	4.41	....	....	1	1.47	1	1.38	....	....	....	....	3	4.22	....	....	....	....
Varicocele	2	2.94	....	....	....	....	....	....	....	....	....	....	1	1.41	....	....	....	....
Genito-urinary, others	7	10.29	....	....	....	....	2	2.75	....	....	....	....	....	....	....	....	....	....
Total diseases of the genito-urinary system	12	17.64	....	....	1	1.47	3	4.13	....	....	....	....	4	5.63	....	....	....	....
Adenitis	4	5.88	....	....	....	....	5	6.89	....	....	....	....	....	....	....	....	....	....
Total diseases of the lymphatic system	4	5.88	....	....	....	....	5	6.89	....	....	....	....	....	....	....	....	....	....
Rheumatism, muscular	20	29.41	....	....	....	....	61	84.02	....	....	....	....	6	8.44	....	....	....	....
Osteitis and periostitis	....	....	....	....	....	....	....	....	....	....	....	....	5	7.03	....	....	....	....
Arthritis and synovitis	16	23.53	....	....	....	....	9	12.40	....	....	....	....	4	5.63	....	....	....	....
Rheumatism, chronic articular	6	8.82	....	....	....	....	7	9.64	....	....	....	....	....	....	....	....	....	....
Muscles, bones, and joints, others	2	2.94	1	1.47	....	....	3	4.13	....	....	....	....	1	1.41	....	....	....	....
Total diseases of the muscles, bones, and joints	44	64.71	1	1.47	....	....	80	110.19	....	....	....	....	16	22.50	....	....	....	....
Total diseases of the integumentary system	59	86.77	....	....	....	....	44	60.61	....	....	....	....	57	80.17	....	....	....	....
Total diseases of the eye	15	22.06	....	....	....	....	13	17.91	....	....	....	....	6	8.44	1	1.41	....	....
Total diseases of the ear	19	27.94	1	1.47	....	....	6	8.26	1	1.38	....	....	13	18.28	....	....	....	....
Total diseases of the nose	3	4.41	....	....	....	....	1	1.38	....	....	....	....	3	4.22	....	....	....	....
Total unclassified and undiagnosed	....	....	....	....	....	....	7	9.64	....	....	....	....	1	1.41	....	....	....	....
Total for diseases	1,022	1,502.94	8	11.76	5	7.35	573	789.25	2	2.75	7	9.64	830	1,167.37	6	8.44	8	11.25

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	680						726						711					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Death.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Drowning	....	....	....	....	1	1.47	....	....	....	....	1	1.38	....	....	....	....	....	....
Exhaustion from exposure and fatigue	1	1.47	....	....	....	....	1	1.38	....	....	....	....	7	9.85	....	....	....	....
Heat stroke	4	5.88	1	1.47	....	....	1	1.38	....	....	....	....	2	2.81	....	....	....	....
Venomous bites, stings, and wounds	5	7.35	1	1.47	....	....	1	1.38	....	....	....	....	4	5.63	....	....	....	....
Abrasions, blisters, burns, and scalds	7	10.29	....	....	....	....	3	4.13	....	....	....	....	2	2.81	....	....	....	....
Compression and concussion of brain	....	....	....	....	....	....	....	....	....	....	....	....	1	1.41	....	....	....	....
Contusions and sprains	49	72.06	....	....	....	....	55	75.76	....	....	....	....	17	23.91	....	....	....	....
Dislocations	....	....	....	....	....	....	3	4.13	....	....	....	....	....	....	....	....	....	....
Fractures (not shot)	5	7.35	....	....	....	....	5	6.89	....	....	....	....	7	9.85	....	....	1	1.41
Hernia	5	7.35	2	2.94	....	....	1	1.38	....	....	....	....	....	....	....	....	....	....
Wounds, contused, lacerated, and punctured	14	20.59	....	....	....	....	15	20.66	....	....	1	1.38	8	11.25	....	....	....	....
Wounds, incised	10	14.70	....	....	....	....	2	2.75	....	....	....	....	3	4.22	....	....	3	4.22
Wounds, gunshot	2	2.94	1	1.47	1	1.47	....	....	....	....	....	....	3	4.22	....	....	3	4.22
Secondary results of injury	7	10.29	....	....	....	....	1	1.38	....	....	....	....	1	1.41	....	....	....	....
Other injuries	6	8.82	....	....	....	....	13	17.91	....	....	....	....	2	2.81	....	....	3	4.22
Total for injuries	115	169.12	5	7.35	2	2.94	101	139.12	....	....	2	2.75	57	80.17	....	....	10	14.06
Total for diseases and injuries	1,137	1,672.06	13	19.12	7	10.29	674	928.37	2	2.75	9	12.40	887	1,247.54	6	8.44	18	25.32

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Medical Corps.						Others.					
Mean strength	4,283						3,676					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.23										
Measles	29	6.77			1	0.23	44	11.97				
Smallpox	11	2.57					6	1.63				
Vaccinia	29	6.77					338	91.95				
Influenza	81	18.91					142	38.63			1	0.27
Dengue	181	42.26					9	2.45				
Mumps	16	3.74					37	10.06				
Diphtheria	1	.23										
Typhoid fever	44	10.27			3	.70	15	4.08			1	.27
Yellow fever	19	4.44			2	.47	10	2.72			4	1.09
Malarial fever, intermittent	755	176.28					387	105.28				
Malarial fever, remittent	394	91.99			1	.23	31	8.43				
Malarial fever, pernicious	5	1.17			1	.23					1	.27
Malarial cachexia	64	14.94	2	0.47			17	4.62				
Fever, undetermined	54	12.61					18	4.90				
Erysipelas	3	.70					18	4.90				
Septicæmia and tetanus	1	.23			1	.23						
Rheumatic fever	16	3.74					5	1.36				
Consumption	22	5.14	9	2.10			11	2.99	6	1.63		
Cancer							1	.27				
Syphilis and results	37	8.64	6	1.40	1	.23	15	4.08	4	1.09		
Gonorrhea and results	202	47.16	3	.70			311	84.60	2	.54		
Chancroid and results	85	19.85					75	20.40				
Infections, other	7	1.63	1	.23			3	.82				
Total infectious diseases	2,057	480.27	21	4.90	10	2.33	1,493	406.15	12	3.26	7	1.90
Anemia	10	2.33					4	1.09				
Nutrition, others	7	1.63	2	.47			2	.54	12	3.26		
Total diseases of nutrition	17	3.97	2	.47			6	1.63	12	3.26		
Alcoholism	52	12.14	3	.70			37	10.06				
Brain and spinal cord	11	2.57	5	1.17			13	3.54	4	1.09	2	.54
Insanity	10	2.33	9	2.10			3	.82	3	.82		

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Medical Corps.						Others.					
Mean strength	4,283						3,676					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Meningitis												
Poisoning, narcotic	12	2.80	2	0.47	1	0.23	1	0.27				
Nervous system, others	121	28.25	1	.23			72	19.59	2	0.54		
Total diseases of the nervous system	206	48.10	20	4.67	1	.23	126	34.28	9	2.45	2	0.54
Poisoning, irritant	6	1.40			1	.23	4	1.09				
Tonsillitis, pharyngitis, and sore throat	112	26.15					204	55.50				
Peritonitis							1	.27			1	.27
Dyspepsia, colic, and constipation	181	42.26					250	68.01				
Gastritis	141	32.92					22	5.98				
Dysentery, acute	132	30.82			7	1.63	16	4.35			1	.27
Dysentery, chronic	82	19.15			2	.47	10	2.72	1	.27	1	.27
Diarrheal diseases, others	451	105.30	1	.23	1	.23	233	63.39	1	.27		
Enteritis	66	15.41	3	.70	1	.23	1	.27				
Perityphlitis and appendicitis	13	3.04			1	.23	6	1.63				
Digestive system, others	102	23.82	1	.23	1	.23	67	18.23				
Total diseases of the digestive system	1,286	300.26	5	1.17	14	3.27	814	221.44	2	.54	3	.82
Heart, diseases of	14	3.27	2	.47	2	.47	18	4.90	5	1.36	1	.27
Arteries and veins	13	3.04	3	.70	1	.23	3	.82	5	1.36	1	.27
Total diseases of the circulatory system	27	6.30	5	1.17	3	.70	21	5.71	10	2.72	2	.54
Bronchitis	106	24.75					256	69.64	1	.27		
Pneumonia	8	1.87					14	3.81			1	.27
Pleurisy	17	3.97					18	4.90	1	.27	1	.27
Respiratory system, others	50	11.67	3	.70	1	.23	91	24.75	2	.54		
Total diseases of the respiratory system	181	42.26	3	.70	1	.23	379	103.10	4	1.09	2	.54

Kidneys, diseases of	18	4.20	....	....	1	.23	17	4.62	5	1.36	2	.54
Varicocele	13	3.04	....	....	....	....	10	2.72	7	1.90	....	....
Genito-urinary, others	28	6.54	1	.23	....	....	23	6.26	3	.82	....	....
Total diseases of the genito-urinary system	59	13.77	1	.23	1	.23	50	13.60	15	4.08	2	.54
Adenitis	15	3.50	....	....	....	....	7	1.90	....	....	....	....
Lymphatic system, others	3	.70	....	....	....	....	....	....	....	....	....	....
Total diseases of the lymphatic system	18	4.20	....	....	....	....	7	1.90	....	....	....	....
Rheumatism, muscular	102	23.80	....	....	....	....	81	22.04	....	....	....	....
Osteitis and periostitis	5	1.17	....	....	....	....	3	.82	....	....	....	....
Arthritis and synovitis	13	3.04	....	....	....	....	20	5.44	....	....	....	....
Rheumatism, chronic articular	29	6.77	3	.70	....	....	22	5.98	1	.27	....	....
Muscles, bones, and joints, others	10	2.33	....	....	....	....	10	2.72	1	.27	....	....
Total diseases of the muscles, bones, and joints	159	37.12	3	.70	....	....	136	37	2	.54	....	....
Total diseases of the integumentary system	232	54.17	....	....	....	....	176	47.88	....	....	....	....
Total diseases of the eye	45	10.51	5	1.17	....	....	34	9.25	....	....	....	....
Total diseases of the ear	46	10.74	7	1.63	....	....	19	5.17	....	....	....	....
Total diseases of the nose	2	.47	....	....	....	....	3	.82	....	....	....	....
Total unclassified and undiagnosed	1	.23	....	....	....	....	32	8.71	....	....	....	....
Total for diseases	4,336	1,012.37	72	16.81	30	7	3,296	896.63	66	17.95	18	4.90
Drowning	....	....	....	....	4	.93	....	....	....	....	1	.27
Exhaustion from exposure and fatigue	12	2.80	....	....	....	....	17	4.62	....	....	....	....
Heat stroke	2	.47	....	....	....	....	1	.27	....	....	....	....
Lightning stroke	....	....	....	....	....	....	....	....	....	....	....	....
Venomous bites, stings, and wounds	34	7.94	....	....	....	....	8	2.18	....	....	....	....
Abrasions, blisters, burns, and scalds	21	4.90	....	....	....	....	77	20.95	....	....	....	....
Compression and concussion of brain	1	.23	....	....	....	....	....	....	....	....	....	....
Contusions and sprains	88	20.55	....	....	....	....	191	51.96	....	....	....	....
Dislocations	4	.93	....	....	....	....	7	1.90	1	.27	....	....
Fractures (not shot)	17	3.97	....	....	....	....	29	7.89	4	1.09	....	....
Hernia	21	4.90	4	.93	....	....	21	5.71	6	1.63	....	....
Wounds, contused, lacerated, and punctured	21	4.90	....	....	....	....	59	16.05	....	....	....	....
Wounds, incised	15	3.50	....	....	....	....	20	5.44	....	....	....	....
Wounds, gunshot	15	3.50	8	1.87	1	.23	6	1.63	....	....	....	....
Secondary results of injury	7	1.63	1	.23	....	....	7	1.90	2	.54	....	....
Other injuries	36	8.40	....	....	2	.47	45	12.24	1	.27	1	.27
Total for injuries	294	68.65	13	3.04	7	1.63	488	132.75	14	3.81	2	.54
Total for diseases and injuries	4,630	1,081.02	85	19.85	37	8.64	3,784	1,029.38	80	21.76	20	5.44

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1900.*

No.		White.	Colored.	Total.
1	Total number recruits examined	38,115	1,801	39,916
	Of each 1,000 of these—			
2	Were accepted for service	558.68	657.97	563.16
3	Were rejected for under height	4.75	6.11	4.81
4	Were rejected for disabilities	360.80	292.06	357.70
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.23	.84	.27
6	61 to 62	.23	1.69	.31
7	62 to 63	1.41	3.37	1.51
8	63 to 64	11.88	15.19	12.06
9	64 to 65	96.98	84.39	96.31
10	65 to 66	135.91	135.02	135.86
11	66 to 67	169.63	184.81	170.43
12	67 to 68	185.73	186.50	185.77
13	68 to 69	155.96	145.99	155.43
14	69 to 70	111.44	114.77	111.62
15	70 to 71	70.72	64.98	70.42
16	71 to 72	34.38	33.75	34.34
17	72 to 73	15.40	18.57	15.57
18	73 to 74	7.14	9.29	7.25
19	74 upward	2.96	.84	2.85
	Causes of rejection (exclusive of under height) expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	1.10	2.22	1.15
21	Tuberculosis of lungs or other organs	3.23	2.78	3.21
22	Imperfect vision	56.57	33.87	55.79
23	Heart disease	32.66	17.77	31.99
24	Goiter	.39	....	.38
25	Varicose veins, varicocele, hemorrhoids	56.43	23.88	54.99
26	Hernia	13.43	14.44	13.48
27	Flat feet	4.91	2.78	4.79

INTERNATIONAL TABLE III.—*Movements of sick by branches of military service and by months.*

VOLUNTEERS AND REGULARS, 1900.

	Absolute numbers.					Proportions per 1,000.			
			Sick disposed of.			In 1,000 of mean strength there were—		In 1,000 sick disposed of there were[1]—	
	Mean strength.	Sick admissions.	Total.[1]	As fit for duty (recovered).[1]	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry	65,688	167,589	....	....	1,889	2,551.29	28.76	....	....
Cavalry	13,500	32,861	....	....	214	2,434.15	15.85	....	....
Artillery	11,125	20,518	....	....	89	1,844.32	8.00	....	....
Ordnance	726	674	....	....	9	928.37	12.40	....	....
Engineers	680	1,137	....	....	7	1,672.06	10.29	....	....
Signal Corps	711	887	....	....	18	1,247.54	25.32	....	....
Medical Department	4,283	4,630	....	....	37	1,081.02	8.64	....	....
All others	3,676	3,784	....	....	20	1,029.38	5.44	....	....
MONTH.									
January	99,061	21,178	....	....	198	213.79	2.00	....	....
February	99,349	19,364	....	....	166	194.92	1.67	....	....
March	99,411	20,755	....	....	186	208.78	1.87	....	....
April	99,741	19,551	....	....	142	196.02	1.42	....	....
May	99,526	20,076	....	....	170	201.72	1.71	....	....
June	99,821	20,978	....	....	182	210.16	1.82	....	....
July	100,907	21,881	....	....	231	216.84	2.29	....	....
August	101,908	20,943	....	....	243	205.51	2.38	....	....
September	101,871	17,585	....	....	247	172.61	2.42	....	....
October	101,672	17,365	....	....	194	170.80	1.91	....	....
November	101,184	15,875	....	....	161	156.90	1.59	....	....
December	100,210	16,529	....	....	163	164.95	1.63	....	....

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[1] Information not tabulated.

INTERNATIONAL TABLE VI.—*Admissions of important diseases by branches of military service.*

VOLUNTEERS AND REGULARS, 1900.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.							
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	923	182	311	11	9	15	52	37	14.05	13.48	27.95	15.15	13.23	21.10	12.14	10.06
2	Bronchitis, all[1]	2,864	756	790	35	33	34	106	256	43.60	56	71.01	48.21	48.53	47.82	24.75	69.64
3	Cholera asiatica	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
4	Cholera nostras[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
5	Diphtheria	27	7	8	......	......	2	1	......	.41	.52	.72	......	......	2.81	.23	......
6	Dysenteria	7,910	965	304	1	49	50	214	26	120.42	71.48	27.33	1.38	72.07	70.32	49.97	7.07
7	Erysipelas	55	8	18	3	......	......	3	18	.84	.59	1.62	4.13	......	......	.70	4.90
8	Febris intermittens (malaria)	43,831	7,739	2,795	45	243	234	760	387	667.26	573.27	251.24	61.98	357.36	329.11	177.45	105.28
9	Febris recurrens[3]	11,729	1,687	846	5	77	43	458	48	178.56	124.96	76.04	6.88	113.23	60.47	106.93	13.05
10	Gonorrhea	4,624	1,505	1,186	6	29	36	202	311	70.40	111.48	106.61	8.26	42.65	50.63	47.16	84.60
11	Hernia	418	90	36	1	5	......	21	21	6.36	6.67	3.24	1.38	7.35	......	4.90	5.71
12	Influenza	696	280	353	54	7	19	81	142	10.60	20.74	31.73	74.38	10.29	26.72	18.91	38.63
13	Insolatio (Hitzschlag, coup de chaleur)	136	34	15	1	4	2	2	1	2.07	2.52	1.35	1.38	5.88	2.81	.47	.27
14	Meningitis cerebro spinalis epidemica	10	1	......	......	......	......	......	......	.15	.07	......	......	......	......	......	......
15	Morbilli	374	33	85	1	1	1	29	44	5.69	2.44	7.64	1.38	1.47	1.41	6.77	11.97
16	Parotitis epidemica	399	47	67	1	......	2	16	37	6.07	3.48	6.02	1.38	......	2.81	3.74	10.06
17	Pneumonia crouposa sive lobaris	171	47	25	2	2	1	8	14	2.60	3.48	2.25	2.75	2.94	1.41	1.87	3.81
18	Rheumatismus articulorum	781	153	79	10	6	8	45	27	11.89	11.33	7.10	13.77	8.82	11.25	10.51	7.34
19	Scarlatina	4	1	......	......	......	......	1	......	.06	.07	......	......	......	......	.23	......
20	Scorbutus	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
21	Syphilis	974	333	214	1	9	6	37	15	14.83	24.67	19.24	1.38	13.23	8.44	8.64	4.08
22	Trachoma[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
23	Tuberculosis pulmonum	335	58	54	......	4	10	22	11	5.10	4.30	4.85	......	5.88	14.06	5.14	2.99
24	Tuberculosis ceterorum organorum[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
25	Typhus abdominalis	690	132	82	4	3	8	44	15	10.50	9.78	7.37	5.51	4.41	11.25	10.27	4.08
26	Typhus exanthematicus[2]	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
27	Variola	226	10	5	......	1	2	11	6	3.44	.74	.45	......	1.47	2.81	2.57	1.63
28	Morbi auris	1,111	181	166	6	19	13	46	19	16.91	13.41	14.92	8.26	27.94	18.28	10.74	5.17
29	Morbi cordis	349	79	46	3	13	2	14	18	5.31	5.85	4.13	4.13	19.12	2.81	3.27	4.90
30	Morbi cutis	13,644	2,848	1,796	44	59	57	232	176	207.71	210.96	161.44	60.61	86.77	80.17	54.17	47.88
31	Morbi mentis	221	23	14	......	1	1	10	3	3.36	1.70	1.26	......	1.47	1.41	2.33	.82
32	Morbi oculi	1,019	221	175	13	15	6	45	34	15.51	16.37	15.73	17.91	22.06	8.44	10.51	9.25
33	Morbi systemat. urin. et sexual (excl. ven. et syphilis)	1,244	331	227	3	12	4	59	50	18.94	24.52	20.41	4.13	17.64	5.63	13.77	13.60

[1] Acute not tabulated separately.

[2] Not tabulated separately.

[3] Including malarial cachexia.

INTERNATIONAL TABLE VII.—*Admissions of important diseases by months (absolute numbers).*

VOLUNTEERS AND REGULARS, 1900.

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	110	114	147	129	156	114	142	115	119	132	124	138
2	Bronchitis, all[1]	549	500	487	397	280	237	249	350	347	439	453	586
3	Cholera asiatica	....	....	....	....	....	....	....	....	....	....	....	....
4	Cholera nostras[2]	....	....	....	....	....	....	....	....	....	....	....	....
5	Diphtheria et croup	11	3	3	2	7	3	2	1	2	1	3	7
6	Dysenteria	750	636	583	567	660	823	1,155	1,202	981	842	675	645
7	Erysipelas	6	3	15	10	9	9	5	10	21	8	7	2
8	Febris intermittens (malaria)	5,473	5,052	5,796	5,204	4,911	4,905	4,835	4,638	3,553	3,810	3,851	4,006
9	Febris recurrens	2,026	1,641	1,540	1,243	1,342	1,265	1,175	1,138	853	800	821	1,049
10	Gonorrhea	553	599	669	595	599	659	683	770	628	744	678	722
11	Hernia	44	57	52	70	61	45	41	50	42	52	38	40
12	Influenza	128	119	339	293	145	86	62	31	29	61	46	293
13	Insolatio (Hitzschlag, coup de chaleur)	16	5	13	16	28	17	19	34	14	10	12	11
14	Meningitis cerebro spinalis epidemica	....	2	1	1	1	....	....	1	....	3	1	1
15	Morbilli	97	126	144	79	41	20	8	11	19	6	7	10
16	Parotitis epidemica	192	92	46	51	35	31	26	25	17	16	20	18
17	Pneumonia crouposa sive lobaris	36	28	22	31	16	17	17	21	11	19	21	31
18	Rheumatismus articulorum	107	82	88	102	86	85	82	92	97	115	84	89
19	Scarlatina	....	....	2	1	....	....	....	....	....	1	1	1
20	Scorbutus	....	....	....	....	....	....	....	....	....	....	....	....
21	Syphilis	144	136	137	123	141	133	106	131	134	120	143	141
22	Trachoma[2]	....	....	....	....	....	....	....	....	....	....	....	....
23	Tuberculosis pulmonum	39	30	35	39	35	44	51	56	36	48	29	52
24	Tuberculosis ceterorum organorum[2]	....	....	....	....	....	....	....	....	....	....	....	....
25	Typhus abdominalis	111	61	111	67	99	64	70	122	88	79	63	43
26	Typhus exanthematicus	....	....	....	....	....	....	....	....	....	....	....	....
27	Variola	50	43	34	27	12	18	28	13	5	10	16	5
28	Morbi auris	100	106	126	128	155	145	134	149	126	154	121	117
29	Morbi cordis	49	42	48	41	42	38	44	35	48	54	44	39
30	Morbi cutis	1,633	1,498	1,560	1,572	1,836	1,748	1,577	1,548	1,585	1,659	1,382	1,258
31	Morbi mentis	17	16	27	28	24	19	22	19	26	40	21	14
32	Morbi oculi	128	108	129	155	148	104	137	132	121	130	129	107
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	128	141	174	184	178	154	149	150	150	159	187	176

[1] Acute not tabulated separately.

[2] Not tabulated separately.

Respectfully submitted.

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Surgeon-General, United States Army.

HON. ELIHU ROOT, *Secretary of War.*

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